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Effect of carrying a stopwatch on 440-yard run times of middle school students

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EFFECT OF CARRYING A STOPWATCH ON 440-YARD RUN TIMES OF MIDDLE SCHOOL STUDENTS

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ABSTRACT

EFFECT OF CARRYING A STOPWATCH
ON 440-YARD RUN TIMES OF MIDDLE SCHOOL STUDENTS

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The purpose of this 8-week study was to determine if the use of a stopwatch would affect 440-yard run times. A total of 117 middle school students, 53 boys and 64 girls were divided into four stopwatch groups: no use, intermittent use, constant use, and free-choice use.

Gender, treatment, and time were analyzed using a 2-way ANOVA with repeated measures on the last factor. The alpha level was set at $< .05$.

Although the data analysis indicated no significant differences between groups, there were statistically significant differences for gender and time. During all tests, boys ran faster than girls. There were also noteworthy comparisons. Although not statistically significant, the constant use of a stopwatch decreased run times for boys, but increased run times for girls. Although not statistically significant, girls' run times were faster when given a choice to use or not use the stopwatch.

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Chapter 1

INTRODUCTION

According to the American Heart Association, children in the United States are less fit today than they were a generation ago (American Academy of Pediatrics, May 2002). Childhood obesity has reached epidemic proportions (Surgeon's General Report, 1996). A sedentary lifestyle is the major determinate for the increase in obesity. Many youth are not getting the minimum of 10 to 25 minutes of vigorous activity, three times a week, recommended by the Centers for Disease Control and Prevention (Lien, 2000). The percentage of students who attended daily physical education classes dropped from 42% in 1995 to 29% in 1999.

Because of health risks associated with inactivity, such as obesity, non-insulin dependent diabetes, and high blood pressure, it is important that parents, teachers, and the community help motivate our nation's youth to seek physically active lifestyles. It is beneficial for parents to model and promote healthy living for their children. Physical educators and coaches need to present exemplary programs that provide a variety of opportunities that encourage everyone to be physically active and fit (CDC, 1999).

California has been addressing both nutrition and physical activity in schools for several years. California's Project Lean (1998) was established to address the nutrition and physical activity needs for low income youth in California. In 2001, legislation was passed to limit the sale of soda and junk foods in middle schools and prohibit the sale in elementary schools starting in 2004. California legislators are considering three bills dealing with physical education. The first bill under consideration would require the State Board of Education to set standards for physical education instruction and monitor the districts' physical education programs (AB 1793). The second bill would require districts to send home results of mandated fitness tests, and require 11th and 12th graders who fail the test to take physical education classes (SB 1597). The third bill being considered by California legislators would require the results of the fitness tests to be incorporated into a school's academic performance index (API) (SB 1868).

By understanding factors that relate to positive and negative motivation,

professionals can more effectively develop and implement health and fitness programs that meet the individual needs of its participants. It cannot be assumed that youths prefer inactivity. Many formerly active youth have withdrawn from sport involvement as a result of excess stress and burnout (Weinberg & Gould, 1999). The attributes associated with exercise, such as cooperation, skill development, teamwork and fitness are reversed in someone who trains too much (Cox, 2002).

Psychologists consider motivation to consist of two elements: intensity and direction. Intensity is how activated a person is; how much energy is put toward a specific goal. Direction involves goal choice (Williams, 2001). Youth need motivational strategies to meet individual needs and develop coping skills to deal with adversity regarding living a physically active life. Social and environmental pressures can positively or negatively affect lifestyle choices. The activity levels of peers and encouragement from family can significantly influence individual physical behavior. Self-efficacy, the degree to which individuals believe they can successfully engage in a new behavior or perform a specific task, is a strong determinant of activity level. Self-efficacy determines goals people set and how much effort will be expended to achieve the goals (Chase, 2001). Sources of self-efficacy are mastery experiences, vicarious experiences, social-persuasion, reduction of stress reactions, and altering negative emotional reactions, and interpretations of their physical states (Bandura, 1977).

Although little effort has been made to investigate the role of fitness testing in schools (Corbin, Whitehead, & Lovejoy, 1988), fitness testing is believed to be a key motivator to involve students in regular physical activity (Jewett, Bain, & Ennis, 1995). Proper test implementation may help overcome negative experiences identified by both elementary and secondary students (Millslagel & Keyes, 2000). An individualized self-testing approach, with emphasis on self-improvement and participation in physical activity, has recently been recommended as motivational (Pangrazi, 2001). Enhancing intrinsic motivation may reduce anxiety associated with individual comparisons and encourage maximum physical effort. In order to properly assess fitness levels, fitness test participants need to be motivated to give their best effort possible.

The purpose of this study was to ascertain the effect of using a stopwatch on 440-yard performance run times of middle school students. Run times represented exercise intensity. Intensity is an important component of the FITT principle for physical conditioning. FITT represents frequency, intensity, time (duration), and task. FITT is recommended by the American College of Sport Medicine (ACSM, 1986) for use as a guideline to obtain benefits of the training effect.

Problem Statement

This study examined:

1. If constant use of a stopwatch would have an effect on 440-yard running times.
2. If intermittent use of a stopwatch would have an effect on 440-yard running times.
3. If having a choice to use or not use stopwatches would have an effect on 440-yard running times.
4. If the running times of participants who used stopwatches were significantly different compared to those who did not use stopwatches.
5. If the withdrawal of artificial feedback (stopwatch) would have an effect on running times.
6. If the use of a stopwatch would enhance running times over time.

Hypotheses

The following null hypotheses were made for the purpose of this study:

1. Running times of participants who constantly used stopwatches would not be significantly different compared to those who did not use stopwatches.
2. Running times of participants with intermittent stopwatch use would not be significantly different compared to those who did not use stopwatches.
3. Running times of participants who were given a choice to use or not use stopwatches would not be significantly different compared to those who were not given a choice.
4. Running times of participants who used stopwatches would not be significantly different compared to those who did not use stopwatches.
5. The withdrawal of artificial feedback (stopwatch) would not have an effect on run times.
6. The use of a stopwatch would not enhance running times over time.

Limitations

The following limitations were associated with this study:

1. The participant's motivation to perform at maximal effort during each trial.
2. Boredom, as a result of performing the tests frequently, may have occurred and affected performance results.
3 Fatigue or muscle soreness may have prohibited maximal effort from one test day to another even though the test was not given on consecutive days.
4. Various weather conditions may have affected performance.

Delimitations

The study was delimited to:

1. Physical education students who completed a 440-yard run without walking.
2. Middle school students at one south San Jose school.
3. Students from the same grade level.
4. Students who returned required consent forms.

Assumptions

1. Repetitive trials may cause boredom and decrease motivation.
2. Use of a stopwatch may cause anxiety, if times do not improve.
3. There may be more anxiety as fatigue occurs.
4. Maximal effort may be difficult to maintain for multiple trials during multiple weeks.
5. Motivation orientation, goal or ego, may affect sustained effort.
6. Intermittent use of a stopwatch may help maintain interest in this feedback device.
7. Improved running times will represent motivation created by the stopwatch use.

Description of Terms

Aerobic capacity is considered the most important aspect of a fitness program. It is the ability of the respiratory, cardiovascular, and muscular systems to take up, transport, and utilize oxygen during exercise.

Artificial feedback (augmented) is information that is not usually available regarding the performance of a task.

Autonomy refers to self-determination (free-choice model in this study) which is a

fundamental component of intrinsic motivation.

Concurrent feedback is information that is provided to the athlete during the performance.

Information feedback is synonymous with augmented feedback, knowledge of results or performance.

Intensity is the level of exertion during a workout. It can be defined in both absolute and relative terms. The training zone for aerobic workouts has been established at 60 to 90% of maximal oxygen consumption (ACSM, 1986).

Motivation is a behavioral choice that affects effort, persistence and performance (Weiss & Ferrer-Caja, 2002).

Terminal feedback is information provided after the task is finished.

Importance of the Study

Fitness tests are used to assess the current fitness level of our nation's youth (Keating, Silverman, & Kulinna, 2002). Based on the importance placed on fitness testing and the claim that fitness testing is a motivational tool for youth to become more active (Jewett et al., 1995), it is important that results effectively measure individual fitness. Motivational strategies need to be used to increase effort during testing and while participating in fitness conditioning programs.

This study determined if the use of a stopwatch would help participants enhance 440-yard performance times. The run times represented exercise intensity. The stopwatch, as a self-monitoring feedback device, was used as a possible motivational tool to increase physical effort during the 440-yard run. Giving the student a choice, such as to use a stopwatch or not, may promote personal control, autonomy, or self-determination which are fundamental components of intrinsic motivation. Individuals who are intrinsically motivated participate in activities for the sake of enjoyment and self improvement (Cox, 2002). These individuals tend to have more persistence and are less concerned with social comparisons and external rewards. It was the intent of this study to determine if a stopwatch could motivate students to improve their 440-yard run time over an 8-week period.

Chapter 2

REVIEW OF LITERATURE

The review of literature chapter is divided according to the following subheadings: the origins of physical education, attitudes about physical fitness and activity, gender issues regarding fitness and activity, fitness testing, aspects of fitness, motivation, motivation theories, motivational strategies, goal-setting, feedback, teaching and coaching, regulatory policies and guidelines, and physical activity for a healthier future.

The Origins of Physical Education

In the early 1920s, the field of physical education developed a twofold purpose (Massengale & Swanson, 1997). One aspect of the field was to provide activity-based and health-content courses for the general student population. The purpose was to engage students in learning situations that would contribute to their immediate physical and emotional well-being and encourage a commitment to live active healthy lives. A second emphasis of physical education was to train physical education teachers and coaches. The early objectives in schools in the 1920s was limited to physical fitness. Research during the time centered around anthropometric measurement and some application work to the development of new exercise equipment. Students were measured and individual statistical information regarding size, growth, and strength were developed. Comparisons were made over the years to attempt to find the "typical" college man and woman. As a result of these studies, prescriptions for specific exercises and activities were made for individual students. Norms established for adults were often used as fitness indicators for youth.

Between 1920-1940, two significant events occurred that increased the need for physical educators. Legislation mandating physical education in public schools was directly related to the tripling of the population in public schools and the high military draft rejection rate, due to physical deficiencies.

From 1930-1949, the recreation movement was established. Education centered on lifelong leisure pursuits and studies to prepare for the vocation. Research during this time were in two major areas: exercise physiology, with focus on cardiovascular fitness assessment, and tests and measurements, with emphasis on physical fitness, general motor

ability, specific skills development, and physical efficiency.

Tests and measurements had two basic functions. 1) To provide accurate data regarding health, abilities, and capacities of pupils to determine individual needs, and 2) to measure program or achievement of pupils according to the objectives of the physical education program. Results could be used for grading and evaluation purposes.

There was public interest in the results of the 1953 Kraus-Weber tests which compared muscular strength and flexibility levels of youth in Europe to those in the United States. The poor performance of American children, 56.6% failure compared to 8% for Europeans, promoted increased interest in fitness assessment and promotion. Attention was focused on the benefits of lifelong exercise. The creation of the American College of Sports Medicine in the early 1950s brought together physical education-based researchers with the medical field to organize and encourage further research. (Massengale & Swanson, 1997).

In the middle of the 1970s men's physical education departments and women's physical education departments began to merge into one department for men and women. It was evident that the study of exercise and sport science was not necessarily gender-specific. From an economic standpoint it often made sense to combine monetary resources.

The progression of the 19th century health-based program transformed into a sports-based program that largely neglected the health-related needs of students in secondary schools (Figone, 2002). With the merger of physical education and athletics under one profession, teachers who also coached were not meeting the needs of the general population. Health and fitness programs were considered secondary to instruction in sports (Lewis, 1969).

In the 21st century, many school districts neglect the behavioral health needs of the vast majority of their students (National Center for Chronic Disease Prevention and Health Promotion, 2001). There is lack of understanding that there is a difference between the basic health-related fitness needs of the majority of high schools students and the program needs of fewer student-athletes. Today there continues to be a sport skills emphasis in most physical education programs. As a result, most middle and secondary school students

today view classes in physical education as unrelated to their health-related fitness needs (Locke, 1992). Students need to participate in programs where physical activity is promoted as an integral part of their lifestyle. Due to sedentary lifestyles and poor diets, childhood obesity has reached epidemic proportions (U.S. Department of Health and Human Services, Surgeon's General Report, 1996). Children are less fit than children of the previous generation (American Academy of Pediatrics, 2002).

Attitudes About Physical Fitness and Activity

Belief in one's competence or ability to participate in physical education activity appears to influence participation in physical activity and fitness levels (Burkhalter & Wendt, 2001). Highly alienated youth and children with lower perceptions of physical competency are less fit. Those who are alienated feel there is a lack of personal meaning, lack of control, and isolation (Corbin & Pangrazi, 1992).

A person's thoughts and beliefs about themselves play an important role in a person's behavior and ability to learn. Competency affects participation level. Perceptions of competence are linked to motivation, engagement, and learning in both classroom and physical education settings (Lee, Hall, & Carter, 1983).

Student beliefs, demographic characteristics, age and gender, are important factors related to student attitudes, beliefs, and participation patterns in physical education. Age is an important factor in addressing attitudes toward physical activity and ability to assess competence. If children have experienced that physical ability can be changed, their motivation to participate in activity will be enhanced (Williams & Gill, 1995).

Boys tend to be more confident about their physical ability than girls (Solmon, Lee, Becher, Harrison, Jr., & Wells, 2003). Girls are more likely to report early negative school sport experiences which may affect future activity patterns (White & Coakley, 1986). Data has indicated that the decline in physical activity is more drastic among females than males. The percentage of young people participating in vigorous activity, at least three times a week, decreased for females (from age 14 to age 18) from 63.1% to 37.5%. The decline for males was 76.1% to 48.4% (National Center for Chronic Disease Prevention and Health Promotion, 1997).

Fitness testing throughout history has proclaimed to provide data to evaluate the needs of the individual, point to the effectiveness of the physical education program, and act as a motivational tool for students to improve performance. If fitness testing is considered to be a motivation for an active lifestyle, it seems that a knowledge of fitness would be desirable. Studies show that students are not very knowledgeable about fitness and believe in many misconceptions (Placek, Griffin, Dodds, Raymond, Tremino, & James, 2001). The majority of students show no understanding of why the performance of the mile run was completed during fitness testing. A study was conducted (Placek et al., 2001) that asked 39 randomly selected 6th grade students from an urban middle school in the northeastern United States whether and why people should exercise. The students were also asked to define fitness. The majority of students equated fitness with looking good and being thin. Sixth graders related being in good shape with appearance. Thirty three percent of students felt exercise assisted in "getting muscles". Many students thought spot reduction was possible and sweating could help you burn off fat and reduce weight. Students had a vague idea about the value of exercise with regard to health.

Many students dislike fitness activities, particularly running (Hopple & Graham, 1995). Research with urban high school students revealed an array of responses. Disengagement, alienation and hostile environments were observed (Cothran & Ennis, 1999; Ennis, Cothran, Davidson, Loftus, Ownes, Swanson, & Hopsicker, 1997) especially when dealing with fitness curriculum. Knowledge about fitness is necessary but is not sufficient to ensure student's participation in an active lifestyle. Few research studies have been conducted to determine how or if physical fitness tests or specific fitness test items affect children's attitudes and knowledge of the tests (Pate, 1991).

Conceptions that students take away from school often are maintained throughout life and are very difficult to change (Chi, Chiu, & deLeeuw, 1991). With the increase in sedentary lifestyles, perhaps fitness testing needs to be reevaluated in terms of its long term effects on future physical activity levels. It cannot be assumed that a fitness curriculum teaches fitness for a lifetime. Fitness testing should perhaps include qualitative, as well as quantitative measurements (Hopple & Graham, 1995). Interviews with students might

assist in understanding the effects of fitness testing with students. Martinek and Griffith (1994) interviewed students from two schools regarding fitness testing. Many students reported that the mile-run test was not meaningful. In addition the students referred to taking the test as painful and something to be actively or passively "dodged."

Current fitness tests, designed by adults, do not seem to be relevant or important to children (Meyer, 1991). The mile run and other test items are viewed as not authentic to real-life contexts. Further exploration of children's thoughts, feelings, and knowledge is necessary regarding fitness tests and the role of regular physical activity in youth and over a lifetime.

Gender Issues Regarding Fitness and Activity

Children's gender, and accompanying "appropriate" behavior, is socially constructed early in life (Duncan, 1997). Very young children, perhaps even in infancy, respond to feedback from parents, teachers and others. By age three, children are aware of implicit rules governing feminine and masculine behavior. Society has dictated that skill in sport is important for boy's social status. Girl's popularity is based on physical attractiveness and meeting and dating boys. Girls are more often judged by appearance rather than for what they achieve (Adler, Kless, & Adler, 1992). Girls lack self confidence in physical activity when the task is perceived as masculine in nature, feedback about the performance is ambiguous or lacking, and when the task involves an evaluative component (Corbin, 2002). Beliefs about gender appropriate activities and conception of ability (innate or acquired) greatly influence beliefs about competence and self-efficacy. Girls need positive feedback and encouragement from parents, teachers, coaches and peers. Becoming more skilled requires confidence and persistence. The results of a study by Sarkin, McKenzie, and Sallis (1997) indicated that boys are typically more physically active than girls. Because girls' physical activity levels were found to be more similar to boy's activity levels during organized physical education, but much less during recess (Sallis, 1993) a recent study by Sallis, McKenzie, Alcaraz, Kolody, Faucette, Roby and Hovell (1997) used an accelerometer to assess the activity levels of fifth graders. The accelerometer measures the intensity of movement in the vertical plane. Physical education specialists using the *Sports, Play, and*

Active Recreation for Kids (SPARK) curriculum taught a 15-minute aerobic-fitness and a 15-minute skills-fitness segment during each lesson. A 2x2 (gender x structure) mixed model ANOVA was used to examine gender differences within structure (physical education and recess). There were no significant differences for age, body mass index, or physical activity during structured physical education. Boys, however, were significantly more active than girls at recess. It was noted that gender differences in physical activity level were more apparent in an unrestricted environment. A study by Eaton and Enns (1986) showed that girls were 94.6% as active as boys in physical education settings, but only 74.2% as active during recess.

Some studies indicate that women are more motivated to participate in sport due to intrinsic motives rather than extrinsic ones (Chantel & Guay, 1996). An athlete's initial reason for participating in a physical activity, whether intrinsic (participating in sport for enjoyment) or extrinsic (participation in sport to gain rewards) usually predicts that participant's attendance and adherence to that particular activity (Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997).

The motivation for Physical Activity Measure (MPAM) contains 23 items asking athletes to give reasons for participating in a particular sport. Ryan et al. (1997) found extrinsic motives were usually athlete's reasons for beginning participation in a particular sport, but intrinsic motives were most common for continuation. Females, on average, participated in sport more for friendship and fun. Males listed, winning as a major motivating factor for participation (Hellandsig, 1998).

A Self-Motivation Inventory (SMI) was developed and then modified for children (SMI-C) because it was determined that self-motivation predicted an athlete's tendency to persist in a sport lacking extrinsic reinforcement (Biddle, Akande, Armstrong, Ashcroft, Brook, & Goudas, 1996). The SMI-C generally correlated with tasks that require physical effort, and in particular, endurance activities such as running tasks requiring physical effort.

Fitness Testing

Failed fitness tests during World War II, poor performance in the Kraus-Weber

Tests in 1954, and the current obesity epidemic has spurred the interest in fitness testing. It was believed that implementing regular fitness tests would be an effective approach to improving youth fitness. Health related associations started to develop nationally available fitness tests for schools (Freedson, Cureton, & Heath, 2000). Over the last 50 years, nationally recognized fitness tests have been revised to emphasize health related fitness and encouragement of student involvement in regular physical activity (Freedson et al., 2000). Even with recent changes, implementation of fitness tests in schools has been seriously neglected (Corbin, Whitehead, & Lovejoy, 1988). Little effort has been made to investigate the role of fitness testing in schools. There is no available data-based research on the implementation and effects of fitness tests in the last decade. It is suggested that the fitness test experience, positive or negative, may have a more motivational affect on future physical behavior than actual test results (Keating, Silverman, & Kulinna, 2002).

Some of the national health-related youth fitness tests include the American Alliance of Health, Physical Education, Recreation and Dance's Physical Best Test, the Prudential FITNESSGRAM, the President's Challenge, and the Brockport Physical Fitness Test. Any test, to be useful, should be valid, reliable, and objectively measure the factors to be tested. Each test should isolate the factors that need to be measured. The test should not require technical competence on the part of the participant unless it is used to assess the technique. Participants need to understand the nature of the test; that is, what is being measured and why. The test procedures should be standardized with regard to test administration, organization and environmental conditions under which the test is administered.

Valid test results can be used to predict future performance and show trends in groups of people. These trends can highlight strengths or weaknesses. Valid tests can also measure improvement and assess the success of a training program. Valid tests can also be used to ability group students as well as motivate participants. Several factors may influence test results such as temperature and humidity, amount of sleep the participant has had prior to testing, the participant's emotional state, the time of day the test is administered, caffeine intake, time since last meal, and the test environment.

Various assessments have been used to determine fitness levels. They include body

composition, cardiorespiratory fitness, muscular strength, muscular endurance, and physical activity surveys. Physical activity surveys are not always accurate because Americans typically think they are more active than they are (Reuters.com., 2002). Eighty four percent of adolescents report getting enough exercise to maintain their health. A 1996 Surgeon General report concluded that 60% of all Americans are not active enough.

The FITNESSGRAM (Cooper Institute, 1999), in its fourth revision, is a popular assessment test given to youth. The FITNESSGRAM is a test of choice to be given to all California children with scores being reported to the state in grades 5, 7, and 9. The FITNESSGRAM is a comprehensive health-related fitness, activity assessment test as well as an educational component. It includes a computerized reporting system. The intention of the test is to help teachers develop effective youth fitness programs to promote physical activity as part of daily living. The goal of the FITNESSGRAM is to develop affective, cognitive, and behavioral components related to participating in regular physical activity regardless of gender, age, and disability.

Health-related physical fitness includes several aspects: aerobic capacity, body composition, muscular strength, endurance, and flexibility. Fitness testing in the past emphasized and rewarded high attainment on the various components of fitness. Making the test extremely competitive and comparative doesn't promote the objective of good health and improved function. A more contemporary goal is to encourage partner or self-assessment and individual planning of programs that will encourage lifelong fitness. It is important that students understand the different aspects of health and fitness and strive to reach and maintain fitness scores within the healthy fitness zones prescribed by the FITNESSGRAM. Research was used as a basis for establishing the FITNESSGRAM health fitness standards (Blair, Clark, Cureton, & Powell, 1989). Because there is a significant decrease in risk of all-cause mortality by making active the lowest 20% of the inactive population, the healthy fitness zone (HFZ) was established. The HFZ represents fitness scores above 20% and up to 60% of the population.

When assessing children under 10 years of age, it is strongly encouraged not to emphasize performance level and test results. For this reason, performance standards are

not available for the aerobic capacity test for children in this age group.

Aspects of Fitness

Aerobic capacity is considered the most important area of any fitness program. Aerobic capacity is the ability of the respiratory, cardiovascular, and muscular systems to transport, and utilize oxygen during exercise. Research shows that acceptable levels of aerobic capacity are associated with reduced risk of high blood pressure, coronary heart disease, obesity, diabetes, some forms of cancer and other health problems in adults. Aerobic capacity in relation to body weight is considered to be the best indicator of a person's overall measurement of aerobic capacity. Field tests used for aerobic capacity have shown strong reliability and validity against measure of VO2max (Blair, Clark, Cureton, & Powell, 1989).

Due to maturity, heredity, and body composition, some children may be assessed within the "healthy" zone of the FITNESSGRAM, but are not adequately active to maintain optimum health benefits. Other children may be active but their test scores do not indicate their true ability. This could be a result of test anxiety. The most recent revision of the FITNESSGRAM (1999) has addressed this issue by adding a questionnaire to the children's version of the fitness software to improve the prescriptive information given to the child. Assessment includes three brief questions based on items from the Youth Risk Behavior Survey. The Youth Risk Behavior Survey (YRBS) is a national surveillance instrument used to track nationwide trends in physical activity. The questions ask the students to report the number of days in a given week that they perform different forms of physical activity (aerobic, strength, and flexibility). The assessment summary will mention the importance of sustained activity on lifelong health and fitness, even if test results fall within the "healthy" zone.

If aerobic capacity is the most important indicator of fitness, then adequate physical activity is mandatory for optimal health. The U.S. Department of Health and Human Services (2002) reported that a large population of our youth are inactive and obese. It is important to find ways to help the sedentary become more active. By understanding the different aspects of motivation, it may be possible to develop strategies that will enhance

physical activity.

Motivation

Motivation is defined as behavioral choice, effort, persistence, and performance (Weiss & Ferrer-Caja, 2002). There are three major motives for children and adolescents to participate in physical activity in leisure or organized sport. The first motive is the need to develop and demonstrate physical competence, such as demonstrated through athletic skills, physical fitness, or physical appearance. The second motive is related to gaining social acceptance and support. This includes friendships, peer group acceptance and approval, reinforcement and encouragement by significant adults. Encouragement from parents, teachers, and coaches is the key to initiating and continuing participation. The third motive is to have fun. Fun derived from participation enhances positive experiences and minimizes negative experiences. Enjoyment is likely to enhance the attractiveness of the current activity and decrease the appeal of alternative activities.

Level of self-esteem, feelings of competence, and social support influence motivation or commitment to sport. Positive experiences encourage starting or continuing in an activity. Negative experiences, however, may lead to frustration and eventual dropout (Weiss & Ferrer-Caja, 2002).

Approximately 600 elementary school children (grades 1-6) completed a loneliness rating scale and several fitness tests. Loneliness was associated with feelings of dissatisfaction with current interpersonal relationships. ANCOVA tests revealed that lonely children were less physically fit and physically active than those not lonely. This study suggests that lonely children may lack social and/or physical skills necessary to effectively interact and function in group settings. Since physical activity often provides a social opportunity for children, this could start a cycle of poor social interaction, rejection or withdrawal, reduced physical activity and reduced physical fitness (Page, Frey, Talbert, & Falk, 1992).

Motivation Theories

Three major reasons for participation in physical activity are illustrated in Harter's (1987) model of self-esteem. The model was later adapted for the physical activity domain

by Weiss and Ebbeck (1996). The sources and consequences of self-esteem for physical activity behavior are portrayed. Perceived competence, or adequacy, and social support represent the determinants of self-esteem. Enjoyment and physical activity behavior are outcomes. Perceptions of physical competence refers to an individual's judgment regarding ability in a particular area. According to Harter (1978), individuals who perceive themselves to have high competence, combined with internal control will be more intrinsically motivated. Perceptions of competence encourage effort, persistence, and higher levels of achievement (McKiddle & Maynard, 1997). Youth who report the strongest beliefs about physical competence are more likely to enjoy the activity and sustain interest (Weiss & Ebbeck, 1996).

Research shows a strong correlation between physical competence and peer acceptance (Kunesh, Hasbrook, & Lewthwaite, 1992; Weiss & Duncan, 1992). Children who feel they are popular with their peer groups are more motivated to continue participation to maintain their friendships, experience greater enjoyment, and exhibit less anxiety associated with the physical activity. Children view sports as a mechanism to develop close friendships and allow opportunities for emotional support and self-esteem affirmation (Weiss & Ebbeck, 1996). Both female and male youth reported that close friendships in sport or physical activities made them feel better about themselves physically, that they liked the physical activity and sports more, were motivated by challenging activities, and were more physically active (Smith, 1999).

Self-efficacy Theory: (Bandura, 1977). The degree to which individuals believe they can successfully engage in a new behavior or perform a specific task is called self-efficacy. Self-efficacy enhances human accomplishment and personal well-being. People with high assurance in capabilities approach difficult tasks as challenges to be mastered rather than threats to avoid. It encourages intrinsic interest and deep involvement in activities. People with self-efficacy set challenging goals and maintain a strong commitment to reach the goals. Sources of self-efficacy are mastery experiences, vicarious experiences, social-persuasion, reduction of stress reactions, and altering negative emotional reactions and interpretations of their physical states. According to Feltz (1992), previous performance is

the strongest predictor of efficacy toward future performance. Athletes with high efficacy view their state of arousal as energizing and an asset to increase physical performance. Those athletes with low efficacy look at arousal as debilitating. An athlete's self-efficacy beliefs contribute to motivation in many ways. The self-efficacy beliefs determine the goals people set, how much effort they expend in achieving the goals, how long they persevere in the face of difficulties, and their resilience to adversity.

Motivational Strategies

Self-efficacy can be improved by modeling or observation, tracking progress, and providing opportunities for success. Watching others perform new behaviors and overcome barriers helps motivation (Oman & King, 1998). Providing detailed information and feedback on goal setting and self-monitoring allows participants to take an active role in overseeing their individual progress. Providing adequate training and reinforcement of basic, activity-specific skills allows participants to experience success, which helps build self-confidence. Previous success is considered the strongest aspect of motivation. Use of constructive feedback provides opportunities for guided practice and positive reinforcement. This supports the athlete's effort to learn performance skills and behaviors on their own, with a decreased reliance on a coach over time. Becoming independent thinkers will help individuals make informed decisions regarding active living throughout their lifetime.

Several psychological strategies can be used, to enhance physical performance. Four mental skills are: segmenting, task-relevant thought content, positive self-talk, and use of mood words. When strategies are initiated by the athlete they can reduce distractions and stress, enhance performance, create consistency, improve coping skills, and minimize performance deficiencies (Rushall, 1978).

Performance segmenting is the breaking down of long duration events into smaller, manageable segments. It is much like setting short-term goals, to reach a long-term outcome.

Task-relevant thought content allows the participant to reduce distraction, and increase focus. This method ensures that all resources are available and used, in a most efficient manner, during a competition (Rushall, 1995).

Positive self-statements, allows the body's physiology to perform more efficiently, than when under a negative mindset. Positive self-talk helps increase coping capacity, self-concept, and self-efficacy. Self-talk needs to be realistic. Appropriate uses for this behavioral strategy in competition include encouragement, handling effort, evaluating segment goals, and maintaining a positive attitude. The talk should continue throughout the activity.

Mood words are basic words which, when said or thought with adequate feeling, emphasize movement or emotional outcome. Mood words cause a physical reaction in the body. Words are usually monosyllabic. They represent strength, power (force), speed, agility, balance, and endurance. When used, this strategy is more effective than imagery, during performance.

Mental strategies are effective ways to increase performance without expending much energy. Psychological factors, can be better discriminators of high-level performance capability, than physiological measures.

Attentional preferences can affect the amount of exertion an athlete displays. Runners usually prefer the associative style of attention for competition and the dissociative style for practice runs (Masters & Ogles, 1998). It is believed that greater intensity is achieved while internally associating feedback from the body. Contrary to this, dissociation is focusing on more pleasant things. It is believed to be more relaxing and preferred during training and recreation runs.

Goal setting is an important aspect of motivation. A knowledge of current ability is necessary for establishing realistic goals for future improvement.

Goal-setting

A goal is defined as attaining a specific standard of proficiency on a task, usually within a certain period of time. Goal-setting helps motivate, leads to feelings of success if obtained, helps build self-esteem, measures progress, focuses effort/intention, and leads to long-term persistence. Some goals are psychological as well as physical. Effective goal-setting can be remembered by the following acronym: SMART (Weinberg & Gould, 1999). Goals should be specific, measurable, action-oriented, realistic, and timely. It is important

that individuals feel in control of their goals.

There are several types of goals including outcome goals, performance goals, and process goals. Outcome goals represent standards of performance focusing on results of a contest. Performance goals focus on improvement based on one's past performance. Process goals pertain to procedures (Williams, 2001).

Knowledge of results is critical in the goal-setting model. Knowledge of results is motivational because it helps initiate the desire for a definite improvement in performance. (Locke, Cartledge, & Koeppel, 1968). Realistic short and long-terms goals should be set to help enhance performance.

Another aspect of goal-setting that is important to consider is goal orientation. Goal orientation is a personality trait that is identified as task or ego, or a combination of both. Task, or mastery, orientation is self-referenced. Success is based on self improvement and skill development and focuses on positive feedback (Cox, 2002). Task oriented individuals are intrinsically motivated. The process of achieving the goal is emphasized over the outcome of achieving the goal. This orientation is related to greater persistence, enjoyment, satisfaction, continued participation, and sense of competence. The type of person that has a task orientation is more inclined to set goals and reevaluate them, if necessary.

Feedback

Feedback is considered an important function related to learning (Lee, Keh, & Magill, 1993). Researchers in sport pedagogy have shown an interest in verifying this importance to achievement in physical education. One of the most common functions teachers perform during instruction is providing feedback to students about their performance of a specific skill. Several terms have been used to represent information feedback including augmented feedback, knowledge of results (KR), and knowledge of performance (KP). The relationship between teacher feedback to achievement in physical education have shown inconsistent results (Lee et al., 1993).

The most effective feedback given to participants depends on the performance and the skill being learned. Feedback can be in the form of intrinsic feedback, extrinsic feedback, positive feedback, negative feedback, terminal feedback and concurrent feedback

(McNevin, Wulf, & Carlson, 2000). Intrinsic feedback is received by the participants as a result of producing a movement through the kinesthetic senses (feelings from muscles, joints and balance). Extrinsic feedback is not inherent in the movement itself, but it improves intrinsic feedback. This is also known as augmented feedback. There are two main categories of augmented feedback; knowledge of performance (KP) and knowledge of results (KR). Knowledge of performance is information about the technique provided verbally or visually. This enables an athlete to establish a kinesthetic reference for the correct movement. Knowledge of results is information regarding the result of the athlete's performance. An example would be the time it took a runner to complete a distance of 440 yards. Positive feedback is used to inform athletes of what was correct about the movement. A correct movement provides a reference point for future execution of a movement. Positive feedback is essential for motivation. Negative feedback is used to inform an athlete of what was incorrect about the movement. Negative feedback must include information on the action(s) required to achieve the correct movement. Terminal feedback is information provided to the athlete before or after the performance. Concurrent feedback provides information to the athlete during the performance. An example is the use of a stopwatch that is always in view.

Theorists are in complete agreement that information feedback is essential for skilled performance. After reviewing numerous studies that manipulated various sets of feedback factors, Bilodeau came to the following conclusion regarding the frequency of the feedback: "This appears very clearly in the need for information feedback in improving and sustaining performance, or in three repeatedly demonstrated empirical effects: performance fails to improve unless information feedback is introduced; performance improves with information feedback, and performance either deteriorates if information feedback is withdrawn, or shows no further improvement." (Bilodeau, 1969).

The two main types of information feedback are intrinsic and artificial. Intrinsic information feedback is inherent in a task. An example is boundary lines on a court that let an athlete know if the ball is in or out of play. Intrinsic feedback allows the performer to evaluate a response. Sports, such as, tennis, bowling, badminton, and golf provide large

amounts of intrinsic evaluative feedback. Running events, swimming, and dance provide small amounts (Rushall & Siedentop, 1972). Physical educators should experiment with various kinds of training devices, especially in activities where the amount of intrinsic evaluative information feedback is minimal.

Artificial information feedback refers to information that is not usually available in the performance of a task. This additional information that is added by the teacher for training purposes is also referred to as augmented feedback. The most common form of artificial information is the evaluative comments made by an instructor. Unfortunately, evaluating and giving verbal feedback to an individual performer focuses the teacher's attention on one person at a time. An important consideration for physical educators and coaches is to find ways to provide extra performance information to as many learners as possible during or immediately after their performances. Possible feedback devices are pacing machines, ergometers, metering devices, and other evaluative tools (Rushall & Siedentop, 1972).

Results of research dealing with the effectiveness of artificial information feedback have not been too encouraging. Many studies find that performance is increased while artificial information feedback is present but deteriorates once it is removed (Bilodeau, 1969). In order for augmented feedback to be effective, it is essential that the performer utilize intrinsic cues once the feedback is removed. It is important to find feedback instruments that will increase performance during training and allow for the transfer to intrinsic information feedback sources which will maintain performance at high levels after training.

A possible way to maintain training effort sustained with concurrent information feedback is to gradually transfer control of the behavior from the artificial source to the intrinsic information source. Stimulus fading or gradual withdrawal of the feedback is a way to accomplish this. Siedentop (in press) attempted to do this while having participants learn to walk around a 440 oval track at a particular pace. A "fade" group started out with full concurrent artificial information feedback. Elapsed time was given from the start of each trial and communicated to them verbally. The frequency of artificial verbal feedback

was reduced until during the final training sessions the subjects received only terminal information feedback. Throughout the training session, the faded information feedback group maintained a very high level of performance, but during the transfer sessions when no information feedback was available, this group did not perform as well as another group that was trained under terminal information feedback (IF) conditions. This study showed the difficulty of transferring artificial knowledge of results to intrinsic information feedback cues. Effective methods need to be developed to accomplish the transfer task. It has been possible in some situations (Rushall, 1970) and difficult in others.

In sheer repetitive training situations, such as running and swimming, performers need some kind of artificial information feedback. Usually having some kind of standard or mark is helpful. Terminal information feedback can be delayed somewhat without hindering the acquisition of skill (Annett, 1969). Any recognizable delay in concurrent feedback, however, can destroy the subject's ability to perform.

The three main uses of feedback are descriptive, prescriptive, and corrective. In physical education and sports settings, instructors more often give evaluative feedback to high-skilled learners and corrective feedback to low-skilled learners (Keh, Lee, & Magill, 1989). It could be hypothesized that low-skilled students need evaluative, as well as corrective feedback to be motivated to learn a new skill. Teachers usually provide verbal feedback in the form of positive, nonspecific evaluative statements. Feedback occurs more during skill practice than in a game situation. It is most often directed at individuals as opposed to groups (Fishman & Tobey, 1978). Several students may listen to the same feedback statement, but the understanding and relevance will be unique for each student depending on interest, motivation, goal orientation, perceived competency, and skill level.

Movement skills can be learned without teacher feedback of any kind. If the students have the necessary prerequisite knowledge and are willing to work on producing their own feedback, teacher feedback may not be necessary. External feedback can be essential, not essential, detrimental, and an enhancement for learning skills. These assertions must be tested in the physical education classrooms (Lee et al., 1993).

Many learning and training environments could be greatly enhanced by paying

attention to the amount, specificity, and frequency of the information feedback available to the individual performer.

Teaching and Coaching

Student motivation is crucial to learning, and effective instruction. In order to achieve a goal, there needs to be a willingness to expend the effort necessary. As students mature, their motivation levels often diminish. Factors in the environment, can influence attributions of students that affect behaviors, expectancies, and attitudes (Schunk, 1990). School systems in the United States tend to promote extrinsic values. If teachers want to promote students' perceptions of competence and control, they must increase intrinsic endeavors (Litchfield & Newman, 2001).

Teachers and coaches need to realize that almost everything they do has either a positive or negative motivational influence on students. This includes activities used, presentation methods, interaction with students, the amount of choice and control given to students, and group dynamics for assignments (McCombs, 1994). Educators should help their students learn ways to change negative thinking into constructive outcomes. Teachers should help students see relevance in learning. Teachers should create an environment that encourages problem-solving, by giving students choices and voice, rather than just directly controlling student behavior (McCombs, 1994).

Teachers need to promote intrinsic, self-initiated forms of motivation. A mastery climate of learning needs to be emphasized. Teachers should emphasize personal improvement, choice and learning (Ntourmanis & Biddle, 1999).

An effective coach should structure learning environments that encourage a self-referenced definition of success. This includes improvement, mastery, and enjoyment rather than normative standards or peer comparison. Self-referenced goals are likely to positively influence students' self-perceptions, emotional reactions, and motivation to stay involved in a sport (Allen & Howe, 1998; Black & Weiss, 1992). The teacher should help the student set short-term goals providing rewards that are meaningful to the learner. Rewards or incentives should be provided every time a goal is accomplished (O'Block & Evans, 1984). Success in meeting short-term goals will help add to positive self-concept. Having fun

goals, late in the season, is an effective strategy. Fun goals for practice and training goals enhance mental well-being. Athletes sometimes get frustrated, particularly late in the season. Coaches should teach athletes coping strategies, such as, relaxation techniques and positive self-talk. Relaxation techniques may include diaphragmatic breathing. Slow, deep breathing helps relieve tension in the body and calms the mind. It can be done anywhere and any time. Progressive relaxation is a systematic tensing and relaxing of different parts of the body. The premise is that it is difficult for the mind to be tense in a relaxed body. Visualization is a mental exercise that allows the body to become calm as a result of experiencing pleasing imagery. Positive self-talk, is an easily accessible technique. Giving yourself internal encouragement is a way of increasing self-efficacy. Individuals who can control themselves usually do not demonstrate staleness.

The acronym TARGET is used to identify effective strategies for developing a mastery motivational climate (Weiss, 1995) representing Task, Authority, Recognition, Grouping, Evaluation, and Time. Task variety and effective challenges, opportunities for choices and collaborative decision-making, recognition of effort and self-improvement, partner and small-group problem-solving opportunities, evaluation focused on self-referenced standards, and adequate time allotted for learning and demonstration of skills, facilitates a mastery climate.

Weiss (1995) developed "Ten Commandments for Maximizing Motivation." The commandments are as follows:

1. Focus on teaching and practicing skills. Don't introduce competition too early. Make sure activities are fun and provide variety.
2. Modify skills and activities so there is sequential progressions that match the activity to the child; not the child to the activity.
3. Realistic expectation for each child.
4. Become an excellent demonstrator; provide lots of show and tell.
5. Catch kids doing things correctly: compliment, instruct, and encourage.
6. Reduce kids' fear of trying skills; provide an encouraging atmosphere. Reduce fears of getting hurt—show empathy.

7. KISS: keep instruction short and simple; maximize practice and playing time.
8. Be enthusiastic. It's contagious. Smile, interact, and listen.
9. Build character; be a role model. Identify and take advantage of teachable moments.
10. Let children make some choices. Involve them in the decision-making process. Ask questions.

It is important to realize that there are gender differences in criteria for judging physical competence that emerges during high school years. During this time, boys cite competitive outcomes, speed, and ease of learning new skills as more important in judging physical competence than girls. Teenage girls indicate more use of internal sources; attraction toward physical activity, achievement of goals, and social sources as prominent motivators (Horn & Harris, 1996).

Regulatory Policies and Guidelines

Specific policies and guidelines have been established nationally and locally to help promote active living. (See Appendix F.)

Physical Activity for a Healthier Future

It is obvious that more resources are needed to develop and implement effective physical education programs. If more is not done to educate and motivate our youth to become and stay physically active, the health care costs are going to be staggering.

During budget crises, physical education is still looked at as an elective or a frivolous program not contributing to the academic growth of a child. Assembly Bill 1793 was recently passed in California. This measure requires the California Department of Education to monitor, through the existing Coordinated Compliance Review (CCR) process the number of hours of physical education instruction offered to K-12 pupils. It requires the adoption of model content standards in the curriculum area of physical education. No additional funding has been allocated to compensate for additional time required for these changes to occur.

Politics, when compared to the rest of the developed world, are conservative and oriented toward individual interests and the private sector rather than collective interests and the public sector (Siedentop, 1996). This viewpoint determines what goals are set and what

resources will be provided to meet the goals.

While addressing the health needs of our youth, it is essential to examine the social context of the problem. Focusing on altering risk factors in individuals are unlikely to produce important improvements in portions of the population that are most at risk. Politicians, policy makers, and even educators feel that little can be done to reduce social class inequalities. Because of this, focus has shifted to personal solutions. People are urged to eat better, quit smoking, and be more active. The unpleasant conclusion is that it now appears that improvements in health and mortality, and subsequent reduction in the nation's health costs, depend on improving the social aspect of society. Multilevel public policy solutions and community action programs are suggested.

A California Task Force to Promote Self-Esteem was established to address social problems such as chronic welfare dependency and academic failure (Lockhardt & Ruffin 1994). Epidemiological data suggest that solutions to inactivity problems come from the societal structure rather than from within an individual (Siedentop, 1996). In order to substantially increase the percentage of citizens who value physical activity enough to make activity a choice of life, focus needs to be on prevention rather than correction. We need to stop believing that knowledge in and of itself will promote and sustain change. Knowing what is right may not be enough, if context for change is not available (Siedentop, 1996).

Successful programs have the following characteristics: access, persisting groups, and challenge. Access is fundamental to program success. Programs and facilities have to be accessible, safe, and attractive. Membership in an inclusive, persisting group is very important. Informal social contingencies within groups keep members involved. An important factor in continuing participation is a continuous presence of competent, caring adult leadership. This is particularly important for children. Challenging activities that result in a sense of real accomplishment is an important component of a program's success (Siedentop, 1996).

Most community-based programs are seriously underfunded, unstable, and focus on fixing rather than preventing health problems. Boys and girls from lower social-status communities are seriously under served and have less availability to youth services. This

group, ironically, is the one who could benefit most (Siedentop, 1996).

In 1989, Congress passed the Young Americans Act which establishes broad public responsibility for the well-being of children and youth, but Congress has yet to fund the Act. Thirty-three national sport governing agencies have endorsed the coaching guidelines developed by the NASPE Youth Sport Coalition, but none of these organizations require their coaches to meet those guidelines. A need for safe, accessible, and attractive physical activity infrastructures has been presented, but there is a diminishing civic commitment to provide it (Siedentop, 1996).

The CDC guidelines call for communities to provide easy public access to spaces and facilities that promote safe and enjoyable participation in physical activity. Trends cannot be changed without action at both the local and policy levels. Connecting the school, home, and community to build a physical activity infrastructure for children, youth, and adults is not an impossible quest. If we expect to increase physical activity levels of the next generation, we must change the social context within which they develop. The social context needs changed for the population that is most at risk. Currently, there is little evidence that we are moving in that direction (Siedentop, 1996).

Guidelines to Cultivate Intrinsic Motivation (Sallis, 1994)

At a time when funding and resources are low and inappropriately distributed, it is important for teachers not to lose hope. We need to positively contribute to the well-being of our students. One way is to develop intrinsic motivation in your students. Sallis (1994) has provided Guidelines to Cultivate Intrinsic Motivation.

1. Pay attention to typical physical activity behaviors based on age. Encourage children to maintain their generally high levels of physical activity and adolescents to increase their participation in physical activity.
2. Prepare secondary students to transition to adult life by helping them design and use personal fitness plans.
3. Target age-appropriate motivators. Opportunities for enjoyment, companionship, and adult approval are more likely to motivate young children. Give opportunities to demonstrate self-control, improve body shape, and control stress. These activities are

more likely to motivate adolescents.

4. Make special efforts to motivate and support girls. They are less likely to be active than boys.
5. Don't get caught up in gender stereotypes.
6. Give extra support to those who need it in a sensitive, non-stigmatizing way.
7. Emphasize immediate benefits of physical activity such as looking and feeling better.
8. Build in success so student feels confident to participate.
9. Reduce competition and reward participation instead of performance.
10. Work with physicians to encourage youth to be physically active.
11. Involve families through homework, newsletters, volunteer opportunities, special events and programs.
12. Be physically active yourself. Talk positively about your physical activity endeavors.
13. Teach both elementary and secondary students time management strategies that allow them to plan physical activity within a busy schedule.
14. Be sensitive to factors children may have no control over, such as urban crime and parent work schedule which limit physical activity opportunities.
15. Allow students to choose lower intensity levels, which they are more likely to maintain than higher intensity activities which could cause overwhelming frustration.
16. Be sensitive to income, race, and ethnic background differences among students. Promote inexpensive, low-equipment physical activities that do not require special facilities (Physical Best, 1999).

The quality of life for America's future generation will be physically and economically compromised if today's generation fails to deal with the problems associated with inactivity. We all need to take responsibility to work toward a solution. The actions and behaviors of the youth, the parents, the teachers, the coaches, and policy makers will affect us all.

Chapter 3

METHODS

The purpose of this study was to determine if the use of an artificial feedback device, a stopwatch, would decrease 440-yard run times. A 440-yard run time was used as a measurement of exercise intensity. A 2-way ANOVA (2x4x5) was used with repeated measures on the last factor. Since there was no statistically significant difference between the groups pretest means, the use of a covariate was not necessary. The statistical analysis determined if any of the experimental conditions (no stopwatch use, intermittent stopwatch use, constant stopwatch use, or free-choice stopwatch use) had a differential effect on 440-yard run times.

Participants

Students in five mixed gender middle school physical education classes, taught by the researcher, completed the 440-yard run as a part of the normal physical education curriculum. A total of 117 sixth grade students completed the study; 53 boys and 64 girls. The only data used in this study were from participants who had personal and parental consent form signatures on file (Appendix B). Students not completing all five recorded test runs were excluded from the study. One of four treatment conditions were randomly assigned to each of four classes. A fifth class was used to increase the number of participants in one treatment group that was particularly low in numbers compared to the other treatment groups. Each class was a self-contained treatment group.

Instrumentation

Hand-held stopwatches were used by the teacher and participants in stopwatch treatment groups. Individual recording logs (Appendix C), and class recording logs (Appendix D) were used in this study. Identification labels were worn on the front of each participant's shirt, in the stomach region. Labels were attached with adhesive tape. An audio video camera was used to verify accuracy of 440-yard run times.

Procedures

Since participants were under the age of 18, parents received a letter of consent from the school that required both parent and student signatures (Appendix B). No individual

data were used without parental and participant consent signatures.

Once consent forms were received, the researcher explained that data collection was not mandatory, and at any time, the participants could choose to withdrawal their data from the study. Choosing to withdrawal data from the study did not exclude students from participating in the normal activity of the physical education class. Students were told that no names would be associated with the data or results of the study.

One of the treatment conditions (control, intermittent use, constant use, free-choice use) was randomly assigned to each of four individual classes. Once classes were assigned their treatment condition, instructions were read to each participant group (Appendix E). Prior to this study, all students had experience running with a stopwatch as a pacing tool. All students worked on endurance conditioning 6 weeks prior to the study. All treatment groups were introduced to the concept of maximal effort and were given information regarding the importance of fitness.

Students were given 3 minutes to warm-up before each timed run. Students were instructed to give maximal effort during each day of the 440-yard run. They were asked to try to run a steady pace and complete the run in as fast a time as possible. Students were told that the run time was a personal measure of how fast each student could run each day. It was important that students run their own pace and not slow down or speed up to run with other students. Students were not allowed to give verbal encouragement to other students. The teacher called out the official run times as each participant finished. This procedure assured that the official time and the recorder's written time represented the same result. A video camera was used to verify close finishes. The video tape was reviewed upon completion to verify final results.

A 440-yard track was measured and burned on a grass field used by the middle school for fitness testing and conditioning purposes. Students were asked to run the 440-yard distance several times over an 8-week period of time. Students wore an identification number on the front of their shirt. Each student chose a partner who recorded the official run times called out by the teacher. Partners verified that their runner completed the 440-yard distance without walking. Times and completion status, walk or run, were recorded on

an individual log sheet (Appendix C).

Design

Each treatment group ran the 440-yard run once during the first week (pretest) and once during the eighth week (posttest). During weeks 2-7, students completed the 440-yard distance twice a week. During the pretest and posttest, no participants were allowed to carry a stopwatch. Although 14 test runs were completed during the 8 weeks, test data were collected only 5 times during the study; once during the first week (pretest), second week (test 3), fourth week (test 6), sixth week (test 11) and eighth week (posttest). This allowed for several probe points to determine if fluctuations in intensity were occurring. The treatment groups consisted of a control group (no stopwatch use), an intermittent group (alternating stopwatch use), a constant use group, and a free-choice group. Group 1 (no stopwatch), was the control group and students did not use stopwatches during any of the runs. Group 2 (intermittent stopwatch use) runners alternated the use and no use of the stopwatch on an every other run basis. Group 3 (constant stopwatch use) runners carried and used stopwatches during all test runs except for the pretest and posttest where only the teacher/researcher used a watch. Group 4 (free-choice group) runners had the choice to use or not use the stopwatch on any given test run, except for the pretest and posttest where only the teacher/researcher used the watch. Students using stopwatches monitored their own run times, but the official run times were collected by the teacher/researcher.

Analysis of Data

The run times were analyzed by using a 2-way ANOVA (2x4x5) with repeated measures on the last factor. The three factors were gender (categorically separated by male and female), treatment conditions (4 levels), and test time (5 tests). The four levels of the treatment condition were the control, intermittent use, constant use, and free-choice use. Data were collected five times: at the pretest, one probe during the second week, fourth week, sixth week, and then at the posttest trial. The probes helped identify any fluctuation patterns that occurred. The alpha level for this study was $p<.05$.

Chapter 4

RESULTS AND DISCUSSION

The purpose of this study was to determine if the use of an artificial feedback device, a stopwatch, would decrease 440-yard run times for middle-school aged boys and girls. A 440-yard run time was used as a measurement of exercise intensity. Data were analyzed using the SPSS statistical program. The results are presented and discussed in this chapter.

Results

Data were analyzed using the SPSS statistical program for the Macintosh System OS X. See raw data in Appendix G. The statistical analyses were adjusted for missing data points.

Means and standard deviations for all groups for all run tests are summarized in Table 1 and graphically represented in Figure 1. Figure 2 shows the group pretest and posttest mean run times. Table 2 summarizes the means and standard deviations for each group and gender. The mean 440-yard run times were similar for each group at the pretest. Group 2, the intermittent use group, had the fastest mean run time of 116.48 seconds (sd=13.27). Group 1, the control group (no stopwatch use) had a mean run time of 119.44 seconds (sd=19.71) on the pretest, with Group 3, the constant stopwatch use group, and Group 4, the free-choice stopwatch use group having similar mean run times to Group 1, with 119.55 seconds (sd=21.53) and 119.96 seconds (sd=21.49) respectively.

Posttest run times for each group were also not noticeably different. Group 4, the free-choice stopwatch use group, had a mean run posttest time of 116.47 seconds (sd=21.01) with Group 3, the constant stopwatch use group, having the second fastest posttest run time of 118.75 seconds (sd=23.82), Group 2, the intermittent use group, the next slowest posttest run time of 119.59 seconds (sd=19.68) and Group 1, the control group, with the slowest posttest run time of 122.19 seconds (sd=18.86).

Table 1

Means and Standard Deviations for Run Times for Groups and Tests (in seconds)

GROUP		PRETEST	PROBE 1	PROBE 2	PROBE 3	POST
1	M	119.44	117.29	120.60	118.50	122.19
	N	32	31	25	32	32
	SD	19.714	19.069	19.153	17.698	18.862
2	M	116.48	115.38	122.18	117.14	119.59
	N	29	29	28	29	29
	SD	13.271	15.240	21.746	19.621	19.679
3	M	119.55	119.55	124.21	116.00	118.75
	N	29	29	28	27	28
	SD	21.528	22.713	20.968	23.950	23.821
4	M	119.96	118.10	119.40	115.28	116.47
	N	50	49	45	46	49
	SD	21.486	21.673	20.695	20.723	21.013
Total	M	119.04	117.65	121.33	116.60	118.91
	N	140	138	126	134	138
	SD	19.494	19.977	20.537	20.325	20.759

Figure 1 displays the group mean run time for each test. Although not statistically significant, group 1, 2, and 4 showed a decrease in run time from pretest to probe 1 indicated by the descending lines on the graph. All groups showed a non significant decline in performance (an increase in time as indicated by the ascending lines on the graph) during probe 2. One possible explanation for this increase in time was due to the decrease in weather temperature during probe 2. Although not statistically significant, all groups increased mean run times (ran slower), from probe 3 to posttest. Again, although not statistically significant, the only groups to show any improvement in run time from pretest to posttest were group 3 (constant use) and group 4 (free-choice group). The constant use of stopwatch group showed the least improvement with a 0.80 second decrease, while the free-choice group showed the greatest improvement with a 3.49 second decrease in run time. Both changes in run times were statistically not significant.

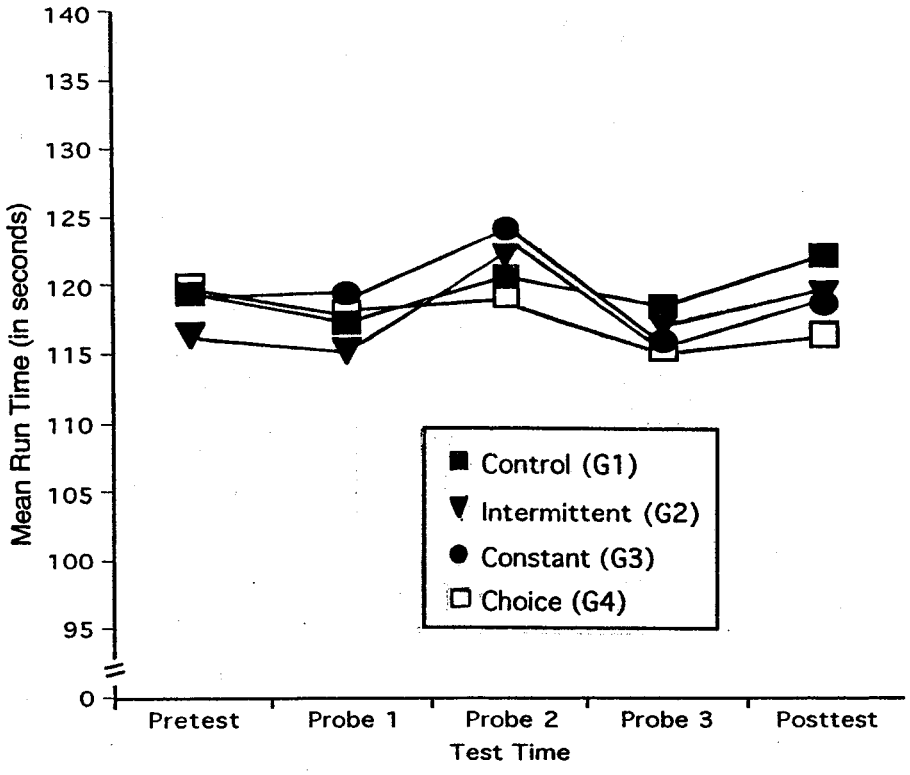

Figure 1. Run time means for each group for each test (in seconds).

Figure 2 shows a comparison of pretest and posttest means for each group. Although not statistically significant, group 1, the control group, ran slower on the posttest (119.44 seconds on the run compared to 122.19 seconds) and Group 2, the intermittent group, was also slower (116.48 seconds compared to 119.59 seconds) from pretest to posttest. Group 3, the constant use group, showed a slight, but statistically non significant decrease in run time (119.55 seconds compared to 118.75 seconds) from pretest to posttest. Group 4, the free-choice group, showed the largest difference in run times from pretest to posttest, but the decrease was not statistically significant (119.96 seconds compared to 116.47 seconds).

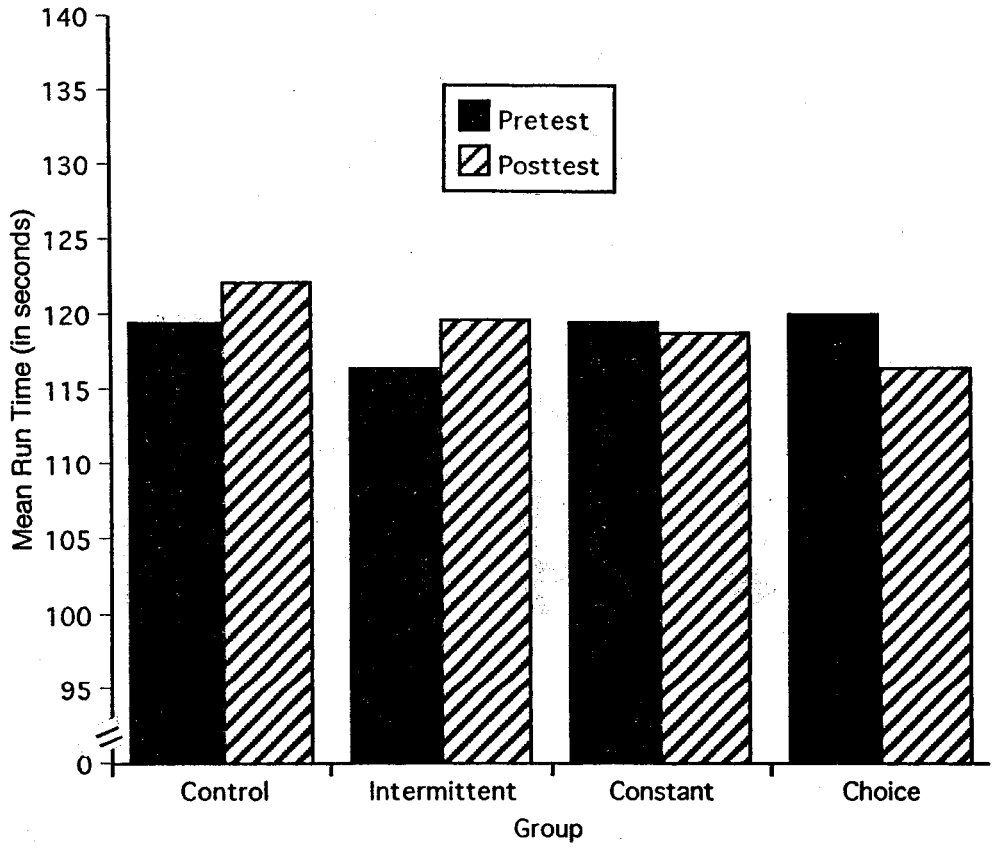

Figure 2. Run times (in seconds) on pretest and posttest for each group.

Table 2

Means and Standard Deviations for Run Times for Groups, Gender, and Tests (in seconds)

GROUP		PRETEST	PROBE 1	PROBE 2	PROBE 3	POST
B1	Mean	120.80	118.20	115.20	116.30	120.10
	N	10	10	5	10	10
	SD	23.541	22.508	21.064	17.023	25.597
B2	M	110.54	107.46	116.17	111.92	112.31
	N	13	13	12	13	13
	SD	14.541	17.481	30.151	26.434	23.203
B3	M	111.28	109.28	114.41	105.83	107.22
	N	18	18	17	18	18
	SD	19.991	20.439	18.947	19.924	19.574
B4	M	112.65	113.00	115.65	112.74	110.74
	N	23	22	20	23	23
	SD	19.890	20.885	19.285	17.086	16.731
B Total	M	113.11	111.62	115.33	111.19	111.53
	N	64	63	54	64	64
	SD	19.422	20.195	21.549	19.922	20.362
G1	M	118.82	116.86	121.95	119.50	123.14
	N	22	21	20	22	22
	SD	18.301	17.800	18.983	18.298	15.536
G2	M	121.31	121.81	126.69	121.38	125.50
	N	16	16	16	16	16
	SD	10.203	9.516	11.574	10.813	14.455
G3	M	133.09	136.36	139.36	136.33	139.50
	N	11	11	11	9	10
	SD	17.132	15.279	14.030	17.972	15.313
G4	M	126.19	122.26	122.40	117.83	121.54
	N	27	27	25	23	26
	SD	21.161	21.792	21.672	23.937	23.334
G Total	M	124.03	122.72	125.82	121.54	125.30
	N	76	75	72	70	74
	SD	18.227	18.441	18.659	19.543	19.022

To examine the overall effects of group and gender on the 440-yard run, a 2-way ANOVA with repeated measures on the last factor was calculated. There were no statistically significant differences between groups on the pretest, $F(1, 116) = .211$, $p > .05$ nor the posttest, $F(1, 116) = .497$, $p > .05$. Multivariate tests indicate no statistically significant difference between group and test, $F(1, 116) = .767$, $p > .05$ or gender and test, $F(1, 116) = 1.31$, $p > .05$. The results indicate that 440-run times are not significantly different based on the use or nonuse of a stopwatch by the participants.

Although there are no statistically significant differences between the groups, there are noteworthy comparisons. Analyzing between subjects effects indicated significant differences between gender and time at all test runs. The results are as follows: pretest $F(1, 116) = 9.28$, $p < .01$, probe 1, $F(1, 116) = 11.11$, $p < .01$, probe 2 $F(1, 116) = 7.44$, $p < .01$, probe 3 $F(1, 116) = 9.53$, $p < .01$, posttest $F(1, 116) = 17.65$, $p < .01$. The mean pretest run time for boys was 113.11 seconds, (sd=19.42). The mean pretest run time for girls was 124.03 seconds (sd=18.23). The probe 1 mean run time for boys was 111.62 seconds, (sd=20.19). The probe 1 mean run time for girls was 122.72 seconds, (sd=18.44). The probe 2 mean run time for boys was 115.33 seconds, (sd=21.54). The probe 2 mean run time for girls was 125.82 seconds (sd=18.65). The probe 3 mean run time for boys was 111.19 seconds, (sd=19.92). The probe 3 mean run time for girls was 121.54 seconds, (sd=19.54). The posttest mean run time for boys was 111.53 seconds, (sd=20.36). The posttest mean run time for girls was 125.30 seconds, (sd=19.02).

Table 3 summarizes the percentage of the participants that improved their run times between pretest to posttest within each group and between genders. Figure 3 visually displays results found in Table 3. According to these results, 53.1% of all boys and 46% of all girls improved their run times from the pretest to the posttest.

Table 3

Percent of Students that Improved from Pretest to Posttest in Each Group and Gender

Control (G1)	Total # of Students	# Improved	Percentage Improved
Combined	32	11	34.3
Boys	10	4	40.0
Girls	22	7	31.8
Intermittent (G2)			
Combined	29	9	31.0
Boys	13	5	38.5
Girls	16	4	25.0
Constant (G3)			
Combined	29	15	51.7
Boys	18	11	61.1
Girls	11	4	36.4
Choice (G4)			
Combined	50	34	68.0
Boys	23	14	60.9
Girls	27	20	74.1

Although statistically non significant, Figure 3 indicates that the lowest percentage of participants that improved from pretest to posttest run times for both boys and girls occurred in the intermittent group (group 2). Results showed that 38.5% of boys and 25% of girls improved their run times from pretest to posttest. Only 36.4% of the girls in group 3 (constant stopwatch group) improved their pretest to posttest run times, whereas group 3 boys had 61.1% that improved from pretest to posttest run times. The highest percentage that improved from pretest to posttest run times occurred with participants in group 4, the free-choice group. Group 4 girls showed that 74.1% improved from pretest to posttest run times. In group 4 boys, 60.9% improved pretest to posttest run times.

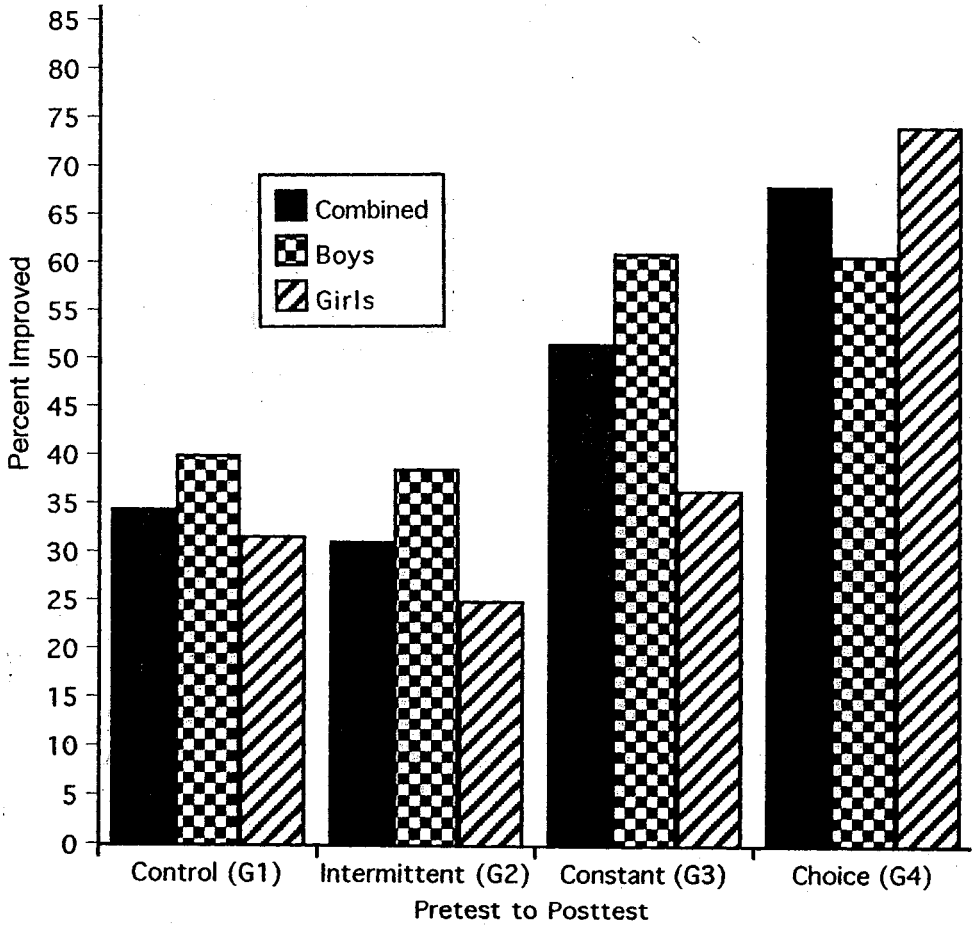

Figure 3. Percent of pretest to posttest improvement for boys and girls.

Figure 4 displays the group mean run times for boys for all tests. Although not statistically significant, group 1 boys (control group) showed a steady decrease in run time during the first three tests and a decline in performance during the last two runs. Boys in the group were the only participants to decrease run time during probe 2. Though not statistically significant, group 2 boys (intermittent) were the only participants not to show a decrease in run time from the pretest to the posttest.

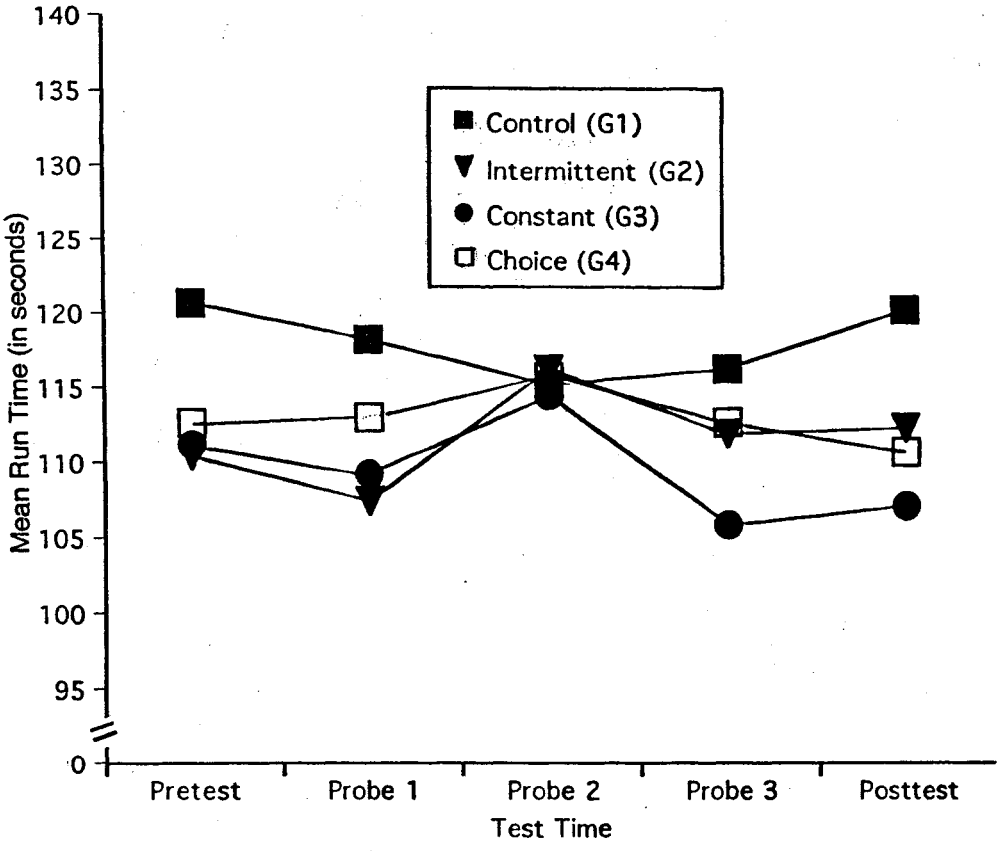

Figure 4. Group mean run times for boys across tests (in seconds).

Figure 5 graphically represents the pretest and posttest run times for boys. Groups 1, 3, and 4 did not demonstrate statistically significant improvements from pretest to posttest. Although not statistically significant, group 3, the constant use group, demonstrated the greatest decrease in their run time (111.28 seconds to 107.22 seconds). Group 4, the free-choice group, showed the second greatest improvement (112.65 seconds to 110.74 seconds). Group 1, the control group, had only a slight decrease in posttest run time (120.8 seconds to 120.1 seconds). Group 2, the intermittent use group, showed a slight, but statistically non significant decrease in performance from the pretest to posttest (110.54 seconds to 112.31 seconds)

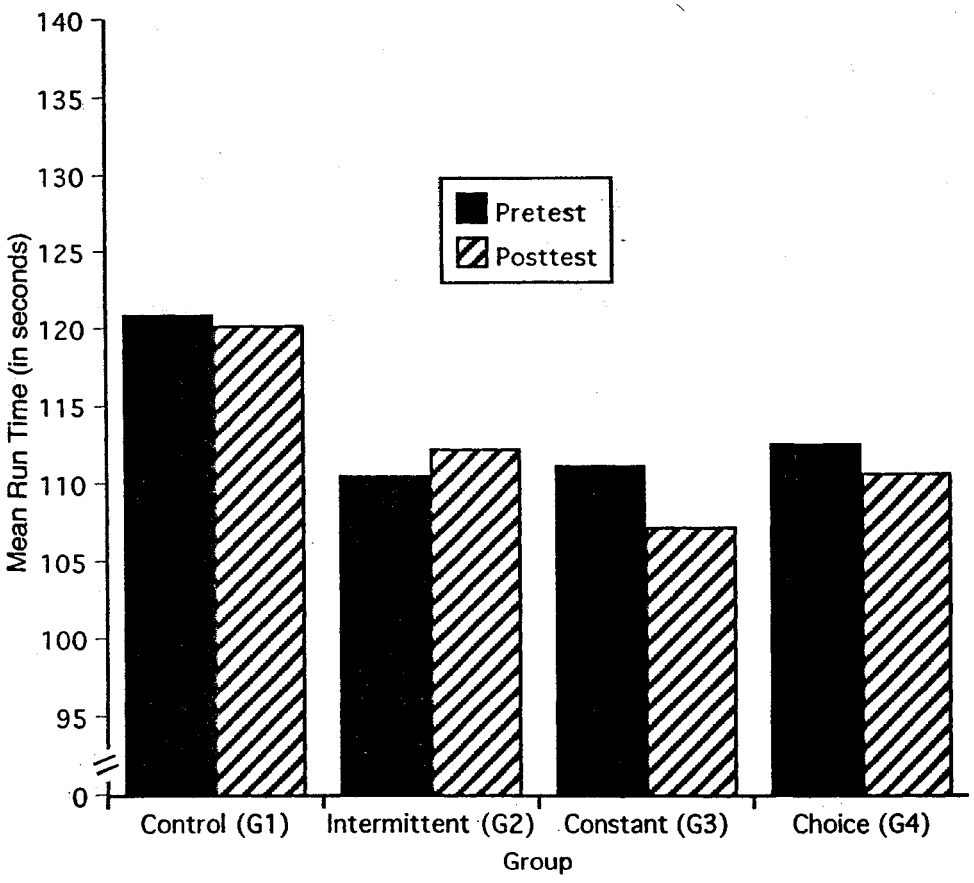

Figure 5. Run times (in seconds) on pretest and posttest for boys.

Figure 6 displays the group mean run times for girls for all tests. Although not statistically significant, group 1 girls (control) ran the fastest during probe 1 and ran the slowest during the posttest. Girls' mean run times in groups 2, 3, and 4 were not statistically significant. Group 2 girls (intermittent group) ran the fastest at the pretest. Group 3 girls showed a slowest run time at the posttest. The only decrease in mean run time from pretest to posttest, although not statistically significant, was demonstrated by the girls in group 4.

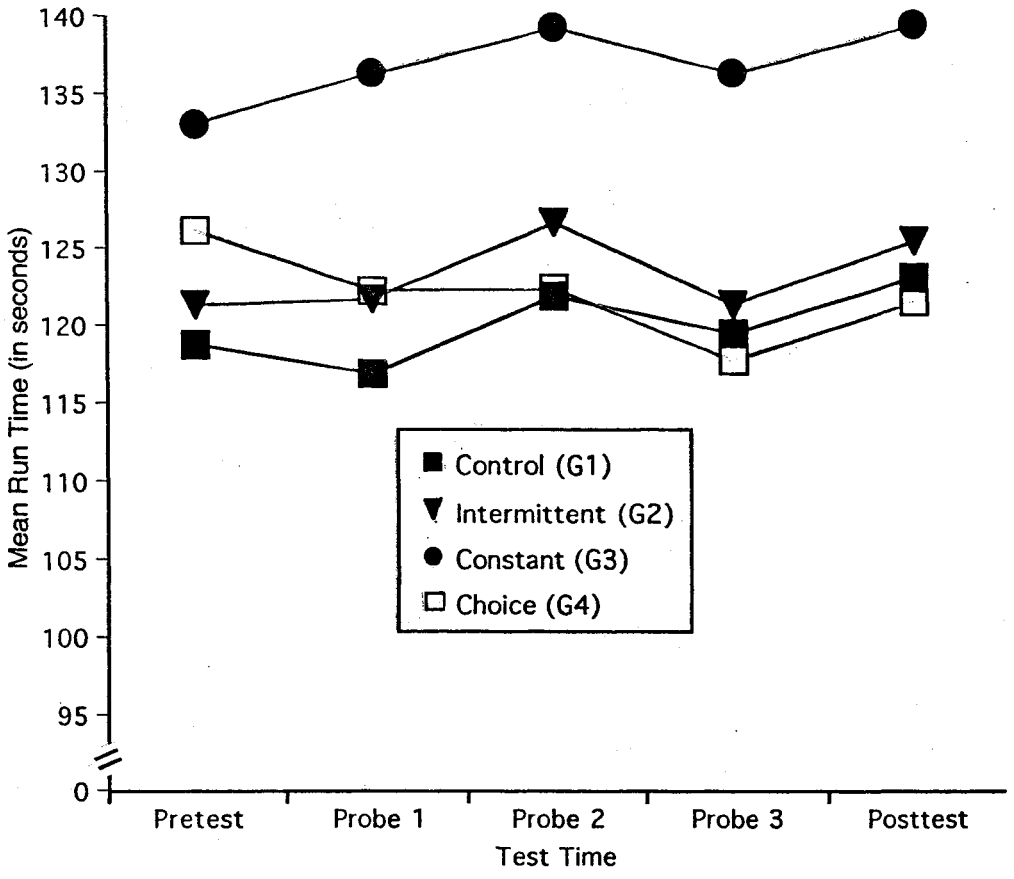

Figure 6. Group mean run times for girls across tests (in seconds).

Figure 7 graphically represents the pretest and posttest run times for girls. No statistically significant differences were found. Groups 1, control group, increased their run time from 118.82 seconds to 123.14 seconds, group 2, the intermittent group, also increased their run time, (121.31 seconds to 125.5 seconds) as well as group 3, the constant use group, which also increased their run times (133.09 seconds to 139.5 seconds) from the pretest to the posttest. Group 4, free-choice group, was the only group that showed a decrease in run time from the pretest to the posttest, although that difference was also not statistically significant (126.19 seconds to 121.54 seconds).

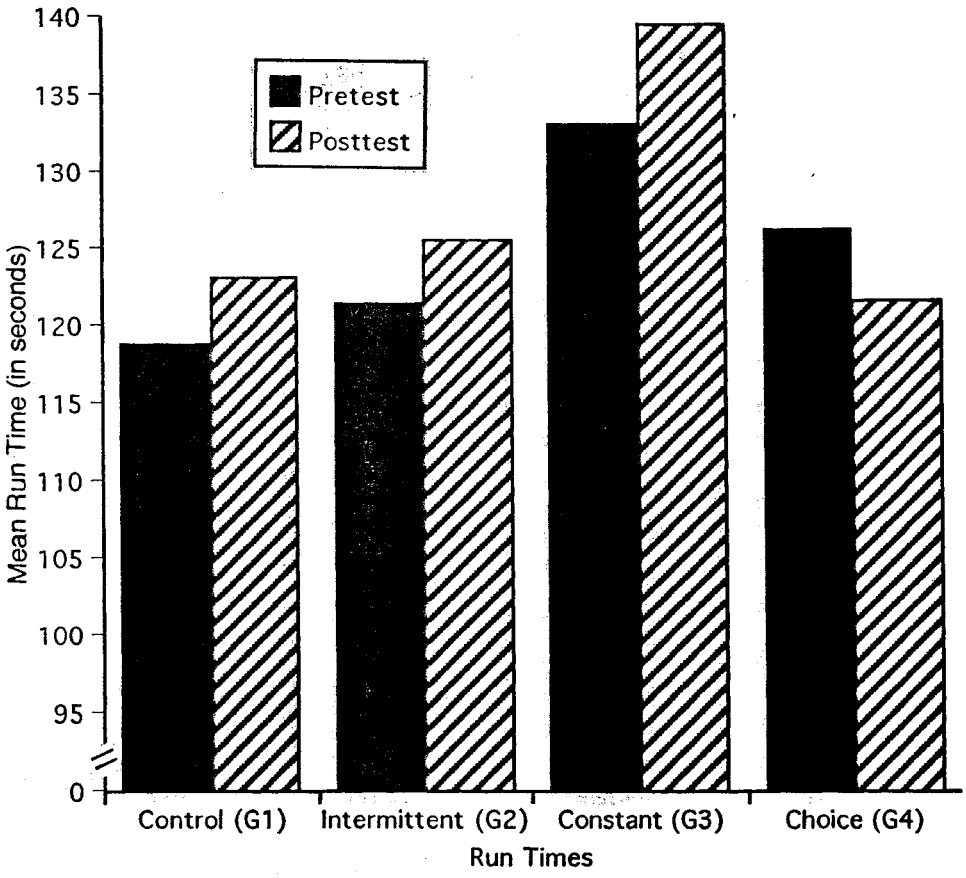

Figure 7. Run times (in seconds) on pretest and posttest for girls.

Figure 8 displays group mean run times of boys and girls collapsed across groups. The pattern produced from data is very similar as to when comparing run test times for both boys and girls combined. The difference in the pattern is at the posttest run. Although not statistically significant, the boys' mean posttest run time was faster than the boys' mean pretest run time, whereas the girls' mean posttest run time was slower than the girls' mean pretest run time.

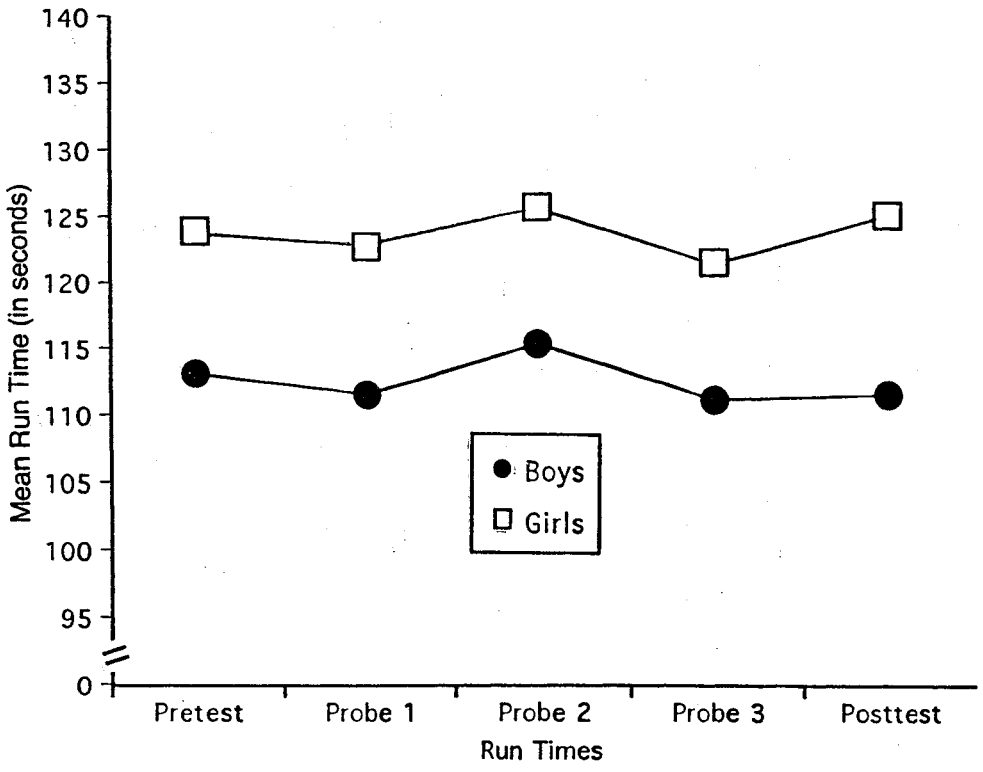

Figure 8. Mean run times for boys and girls across tests (in seconds).

Figures 9-12 compare group mean run times between boys and girls. Figure 9 displays Group 1, the control group's mean run times. Although not statistically significant, similar trends for boys and girls occurred during the first two tests and last two tests. Both boys and girls decreased their run times from pretest to probe 1. Both boys and girls increased their mean run times during probe 3 and the post test. Probe 2 showed a decrease in mean run time for boys, although the decrease was not statistically significant, and an increase in mean run time for girls, although the increase was also not statistically significant. The weather conditions were much colder during probe 2 and perhaps had a differential effect on the girls compared to the boys.

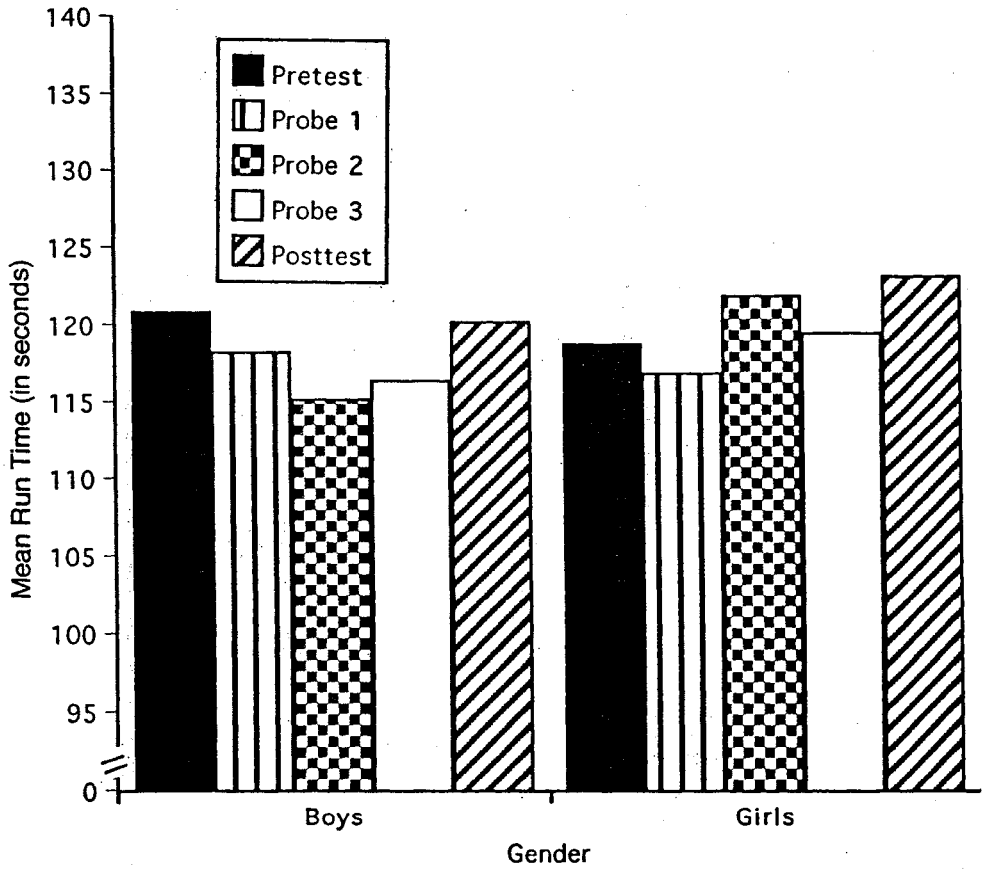

Figure 9. Group 1, (Control) mean run times for boys and girls on all tests (in seconds).

Figure 10 displays group 2, the intermittent stopwatch groups' mean run times by gender. Although not statistically significant, group 2 is the only group that demonstrated a decline in performance (ran slower) for both boys and girls from the pretest to the posttest. Boys' mean run times were 110.54 seconds on the pretest compared to 112.31 seconds on the posttest. Girls' mean run times were 121.31 seconds on the pretest compared to 125.5 seconds on the posttest.

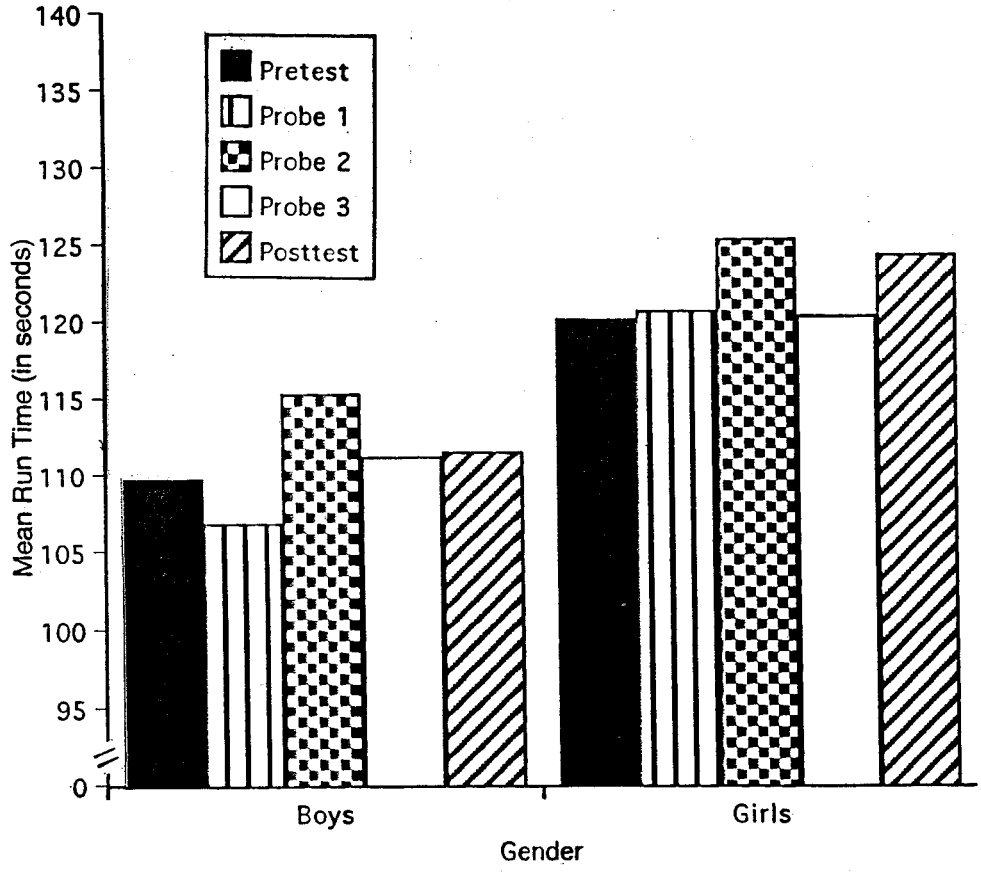

Figure 10. Group 2, (intermittent) mean run time for boys and girls on all tests (in seconds).

Figure 11 displays Group 3, the constant stopwatch use groups' mean run times. Although boys demonstrated a decrease in run time from the pretest to the posttest (111.28 seconds to 107.22 seconds), the change was not statistically significant. The girls' mean run time was slower at the posttest compared to the pretest (133.09 seconds to 139.5 seconds), but again, the difference was not statistically significant.

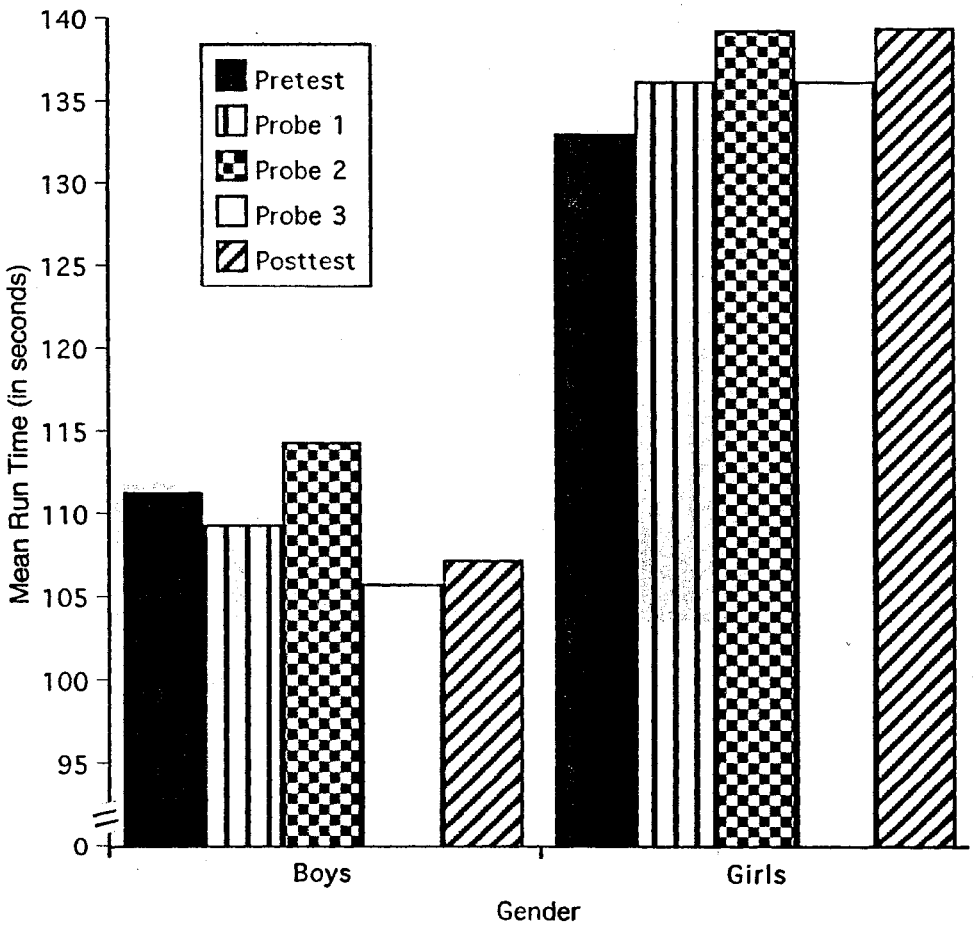

Figure 11. Group 3, (constant) mean run time for boys and girls on all tests (in seconds).

Figure 12 graphically represents Group 4's (the choice group) mean run times. Group 4 results showed no statistical difference from pretest run times to posttest run times, but boys and girls both decreased their run times from the pretest to the posttest. Group 4 girls, although not statistically significant, showed the largest decrease in run time from the pretest to the posttest (126.19 seconds to 121.54 seconds). Boys' had a slight statistically non significant decrease in run time from 112.65 seconds to 110.74 seconds. The fastest run time for boys in group 4 was at the posttest. Probe 3 was the fastest run for girls in group 4.

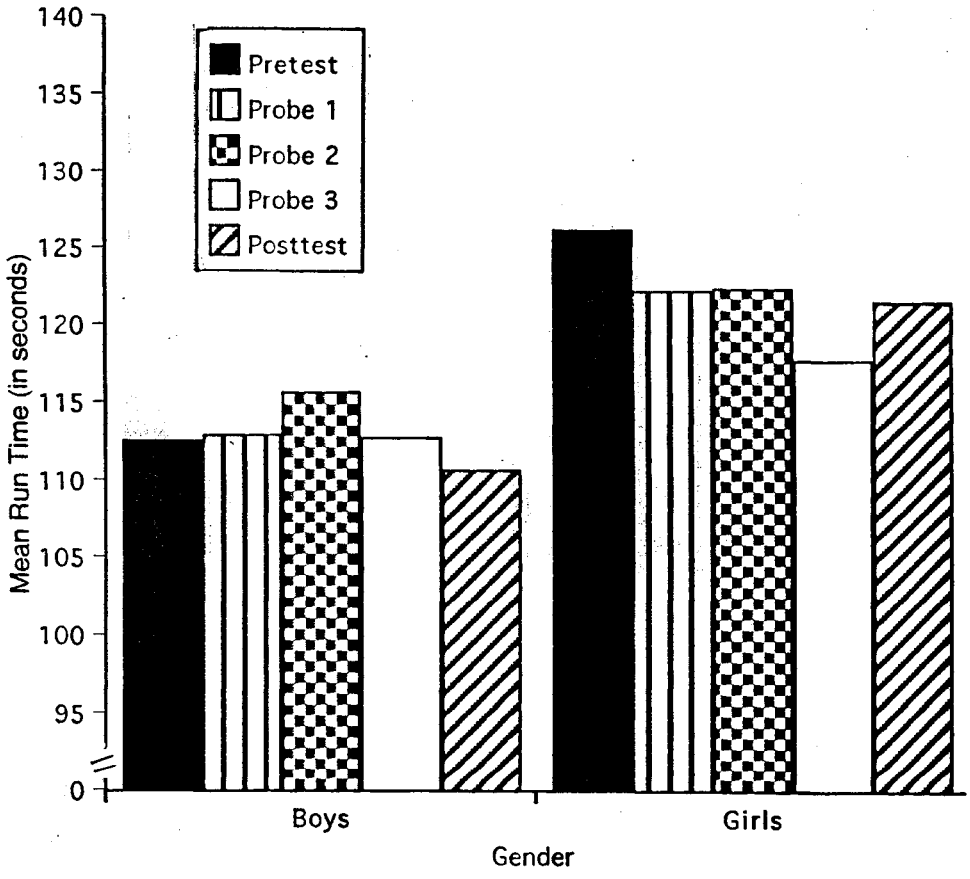

Figure 12. Group 4, (choice) mean run time for boys and girls on all tests (in seconds).

Discussion

Six null hypotheses were tested in this study. Each hypothesis will be addressed separately, followed by a discussion, based on the results.

Hypothesis one stated that the mean run times of participants who constantly used the stopwatches would not be significantly different compared to those who did not use the stopwatches. Based on the statistical analysis, the stopwatch groups' mean run times were not significantly different to the mean run times of other groups. Therefore the null hypothesis is accepted.

Hypothesis two stated that the mean run times of participants using the stopwatch intermittently would not be significantly different compared to those who did not use stopwatches. Based on the statistical analysis, the intermittent stopwatch groups' mean run times were not significantly different to the mean run times of other groups. Therefore the null hypothesis is accepted.

Hypothesis three stated that the mean run times of participants who were given a choice to use or not use stopwatches would not be significantly different compared to those who were not given a choice. Based on the statistical analysis, the mean run times of participants given free-choice to use or not use stopwatches was not significantly different compared to those who were not given a choice to use a stopwatch. Therefore the null hypothesis is accepted.

Hypothesis four stated that the mean run times of participants who used stopwatches would not be significantly different compared to those who did not use stopwatches. Based on the statistical analysis, the use of a stopwatch did not have a significant influence on mean run times. Therefore the null hypothesis is accepted.

Hypothesis five stated that the withdrawal of artificial feedback (stopwatch) would not have an effect on running times. Based on the statistical analysis, the use of a stopwatch had no significant effect on mean run times. Therefore the null hypothesis is accepted.

Hypothesis six stated that the use of a stopwatch would enhance running times over time. Based on the statistical analysis, the use of a stopwatch did not have a statistically significant impact on reducing running times. Therefore the null hypothesis is accepted.

The data indicated that the constant use of a stopwatch had a detrimental effect on

girl's 440-yard run times. For boys, the constant use of a stopwatch appears to enhance 440-yard run times. Using a stopwatch differentially effected boys' and girls' run times. Only 36.4% of the girls in the constant use group showed an improvement from pretest to posttest, while 61.1% of the boys showed improvement from the pretest to posttest.

The literature has made reference to gender differences and performance. According to Corbin (2002), girls lack confidence in physical activity when the task is perceived as masculine in nature, or when feedback about the performance is ambiguous or lacking, or when the task involves an evaluative component. Boys tend to be more confident about their physical ability than girls (Solmon, Lee, Becher, Harrison, & Wells, 2003). Females, on average, participate in sport more for friendship and fun, while males are more motivated by winning (Hellandsig, 1998).

Analyzing individual improvement statistics within groups, not separated by gender, showed the following results: 68% of group 4 (free-choice group) improved from pretest to posttest run times. 51.7% of group 3 (constant use group) improved from pretest to posttest run times. 34.3% of group 1 (control group) improved from pretest to posttest run times. 31.0% of group 2 (intermittent use group) improved from pretest to posttest run times. If teachers want to promote students' perceptions of competence and self-control, intrinsic endeavors must be increased (Litchfield & Newman, 2001). Teachers should emphasize a climate of mastery. Teachers should emphasize personal improvement, choice, and learning (Ntourmanis & Biddle, 1999). According to Weiss' "Ten Commandments for Maximizing Motivation" (1995), children make some choices, and are involved in the decision-making process, and teachers need to construct lessons which allows children to ask questions.

Although personal improvement, choice, and being part of the decision-making process have been shown to motivate children's performance on tasks, this study showed that inconsistency and lack of feedback, as demonstrated in the intermittent stopwatch use group, can be detrimental to performance. The alternate use and no use of a stopwatch resulted in no pretest to posttest run time improvements for boys or girls. Boys and girls often have different interests and are affected by stimulus in different ways. Although the constant use of a stopwatch seemed to enhance boys' run time performance, it appeared to

be detrimental to the performance of girls, whereas girls performed better when given a choice to use or not use the stopwatch.

Chapter 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The major purpose of this study was to determine if the use of an artificial feedback device, a stopwatch, would decrease 440-yard run times in middle school students. The study investigated the use of a stopwatch as a motivational device. Participants included 117 sixth grade students; 53 boys and 64 girls. Participants within each class were randomly assigned to one of four different treatment conditions. The data from a fifth class was combined with Group 4 to increase the number of a participants in that group since it had fewer participants than the other groups. In addition to the control group, Group 1 (no stopwatch use), three other groups existed. Group 2 (intermittent group) used the stopwatch every other day, except for the pretest and posttest. Group 3 (constant use group) used the stopwatch everyday, except during pretest and posttest. Group 4 (free-choice group) chose to use or not use the stopwatch, except during pretest and posttest.

The run times were analyzed by using a 2-way ANOVA (2x4x5) with repeated measures on the last factor. The three factors were gender, group, and test. The groups' mean pretest scores were not significantly different, therefore it was not necessary to use the pretest as a covariate to control for differences between groups. Data were collected five times: at the pretest, one probe during the second week, fourth week, sixth week, and then at the posttest. The alpha level was set at $<.05$.

No significant differences were found except between gender and time. Analyzing between subjects effects indicated significant differences between gender and time at all test runs. The results are as follows: pretest $F(1,116)=9.28$, $p<.01$, probe 1 $F(1, 116)=11.11$, $p<.01$, probe 2 $F(1, 116)=7.44$, $p<.01$, probe 3 $F(1, 116)=9.53$, $p<.01$, posttest $F(1, 116)=17.65$, $p<.01$. Boys were significantly faster runners than girls in all test runs, regardless of the group assigned to them. 440-yard run times were not affected by the use of a stopwatch.

The percent of individuals showing improvement within groups showed some interesting differences. Only 25% of the girls in group 2, the intermittent stopwatch group,

improved their run performance from pretest to posttest. A total of 31.8% of the girls in group 1, the control group, 36.4% of the girls in group 3, the constant stopwatch group, and 74.1% of the girls in group 4, the free-choice group, improved from pretest to posttest. The percent of improvement among the boys was different from the girls. In group 2, 38.5% of the boys improved, in group 1, 40% of the boys improved, in group 4, 60.9% of the boys improved, and in group 3, 61.1% of the boys improved their posttest run times compared to their pretest run times.

Conclusions

Based on the results of this study the following conclusions may be drawn:

1. The use of a stopwatch had no significant effect on 440-yard run times.
2. Boys and girls had significantly different pretest mean run times.
3. The intermittent use of a stopwatch did not significantly enhance 440-yard run times.
4. Over the course of this study, students' run times were not significantly lowered.
5. The constant use of the stopwatch for girls had the opposite effect on running times. Girls in group 3 increased their time more than any other group, yet group 3 boys decreased their running time more than any other group.
6. A greater percentage of girls improved when given the opportunity of choice, to use or not use the stopwatch. A total of 74.1% of the girls in the free-choice stopwatch use group improved from the pretest to posttest, whereas only 36.4% of the girls in the constant stopwatch use group decreased run times.
7. Boys and girls in group 2 (intermittent stopwatch group) ran slower from the pretest to the posttest.

Recommendations

Based on the results of this study, larger numbers of participants should be used for each treatment condition. A larger sample of participants with similar starting times might create more effective comparative results. This 8-week study showed no significant training effect. The length of the study may have adversely affected motivation. Perhaps the study should have taken place in a more environmentally controlled setting. Although the

conditions were similar for each group, the weather and the condition of the track varied significantly throughout the study. The onset of the flu season, late in the study, may have affected performance times in the 440-yard run.

Based on the above conclusions, the following are recommendations that can be made for future research:

1. Since fitness tests are used to assess the current fitness level of our nation's youth (Keating, Silverman, & Kulinna, 2002), there is a need to find ways to motivate participants to do their best effort. Although there has been little effort made to investigate the role of fitness testing in schools (Corbin et al., 1988), fitness testing is believed to be a key motivator to involve students in regular physical activity (Jewett, Bain, & Ennis, 1995). More research needs to be completed in the area of fitness testing. This stopwatch study indicated that when given a choice, a higher percent of participants were able to decrease their run times. Perhaps fitness testing should include a choice of tests, particularly when measuring cardiovascular fitness. If given a choice of test, participants may be more motivated to increase physical effort.

2. Many students dislike fitness activities, particularly running (Hopple & Graham, 1995). Alternative methods for measuring cardiovascular fitness need to exist. Perhaps target heart rate and duration of exercise can be used to measure fitness while participating in non-running activities. Given student choice, such as to use a stopwatch or not may promote personal control, autonomy, or self-determination which are fundamental components of intrinsic motivation. Individuals who are intrinsically motivated participate in activities for the sake of enjoyment and self improvement (Cox, 2002). These individuals tend to have more persistence and are less concerned with social comparisons and external rewards.

3. Few research studies have been conducted to determine how or if physical fitness tests or specific fitness test items affect children's attitudes (Pate, 1991). More gender specific qualitative studies need to be administered. Studies have shown boys tend to be more confident about their physical ability than girls (Solmon et al., 2003). Data have indicated that the decline in physical activity is more drastic among females than males

(National Center for Chronic Disease Prevention and Health Promotion, 1997). This stopwatch study showed that the constant use of a stopwatch decreased run times for boys and increased run times for girls. It is important for physical educators to realize that males and females are not motivated in the same way. Traditional male-biased instruction, emphasizing competition and evaluation, may contribute to the decline in physical activity among females.

4. Current fitness tests, designed by adults, do not seem to be relevant or important to children (Meyer, 1991). The mile run and other test items are viewed as not authentic to real-life contexts. Exploration of children's thoughts, feelings, and knowledge is necessary regarding fitness tests and the role of regular physical activity in youth and over a lifetime. This stopwatch study showed that the aspect of choice increased physical performance (decreased run times). The lack of structure was detrimental to performance as shown by the intermittent stopwatch use group. Students should be allowed to design fitness tests, that incorporate personal interests, and meet specific criteria. Target heart rate, for example, can be used as a measure of cardiovascular fitness. Any vigorous activity could be used to reach target heart rate. This activity does not necessarily involve running. Fitness testing design proposes a problem-solving activity. Finding ways to measure different aspects of fitness, such as flexibility, strength, and endurance, can lead to a better understanding of fitness and testing.

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APPENDIX A

Human Subjects Approval Letter

San José State
UNIVERSITY

Office of the Academic Vice President
Academic Vice President Graduate Studies and Research
One Washington Square
San José, CA 95192-0025
Voice: 408-283-7500
Fax: 408-924-2477
E-mail: gradstudies@sjsu.edu
http://www.sjsu.edu

To: Judy G. Demers
1401 Lansing Avenue
San José, CA 95118

From: Nabil Ibrahim,
AVP, Graduate Studies & Research

Date: April 4, 2003

The Human Subjects-Institutional Review Board has approved your request to use human subjects in the study entitled:

> "The Effect of Carrying a Stopwatch on 440 Yard Run Times of Middle School Students."

This approval is contingent upon the subjects participating in your research project being appropriately protected from risk. This includes the protection of the anonymity of the subjects' identity when they participate in your research project, and with regard to any and all data that may be collected from the subjects. The approval includes continued monitoring of your research by the Board to assure that the subjects are being adequately and properly protected from such risks. If at any time a subject becomes injured or complains of injury, you must notify Nabil Ibrahim, Ph.D. immediately. Injury includes but is not limited to bodily harm, psychological trauma, and release of potentially damaging personal information. This approval for the human subjects portion of your project is in effect for one year, and data collection beyond April 4, 2004 requires an extension request.

Please also be advised that all subjects need to be fully informed and aware that their participation in your research project is voluntary, and that he or she may withdraw from the project at any time. Further, a subject's participation, refusal to participate, or withdrawal will not affect any services that the subject is receiving or will receive at the institution in which the research is being conducted.

If you have any questions, please contact me at (408) 924-2480.

APPENDIX B

Consent Form

San José State
UNIVERSITY

College of Applied Sciences and Arts
Department of Human Performance
One Washington Square
San José, CA 95192-0054
Voice: 408-924-3010
Fax: 408-924-3053

Agreement to Participate in Research

Responsible Investigator: Judy Demers

Title of Protocol: The Effect of Carrying a Stopwatch on 440 Yard Run Times of Middle School Students

My child or ward,_____, has been asked to participate in a research study investigating motivational techniques and performance on the 440-yard run during part of a normal physical education class. The study will be conducted at Castillero Middle School, under the direction of the physical education teacher, Judy Demers, who is completing her Master's Thesis in Kinesiology at San Jose State University on this topic. The procedures have been explained to me, and I understand them. The task involves running the 440-yard run (one time around a regulation size track) during an eight-week period. On week one and week eight, students will run the 440-yard run once. During weeks two through seven, students will run the 440-yard run two times per week, not on consecutive days. The 440-yard run is part of Castillero's normal fitness testing, so no unusual risks are expected to occur. Participants may experience fatigue as a result of running the 440 yard distance. This is normal. Some students will carry stopwatches while others will not. Results will be video taped. The run and the recording will take place the first 15 minutes of each class.

Questions about the research may be addressed to Judy Demers at (408) 535-6385 or directed to Dr. Sue Wilkinson, thesis advisor at (408) 924-3034. Complaints about the research may be presented to Dr. Greg Payne, Department Chairman of Human Performance at San Jose State University at (408) 924-3010. Questions about research, subjects' rights, or research-related injury may be presented to Nabil Ibrahim, Ph.D., Associate Vice President for Graduate Studies and Research, at (408) 924-2480.

I understand that this consent and data may be withdrawn at any time without penalty. I have been given the right to ask questions, and my questions, if any, have been answered to my satisfaction. I understand the data will be reported in group format, and all individual data will be kept confidential and remain anonymous.

Initial_____

The instructor has received permission to conduct this study by San Jose State and the administration at Castillero Middle School.

I understand, that because I am a minor, I also need a parent signature to participate in this study. Signatures below indicate permission and desire to be in this study.

_____

Name of Child or Ward

_____ _____

Parent or Guardian Signature Date

_____

Relationship to Child or Ward

_____

Full Mailing Address

_____ _____

Investigator's Signature Date

APPENDIX C

Individual Recording Log

Individual Recording Log

I.D.#_____ Male___ Female____ Group #____ Trial #____ Per.___

Did participant walk? yes____ no____

Did participant use a stopwatch? yes____ no____

Participant's time:_____

Individual Recording Log

I.D.#_____ Male___ Female____ Group #____ Trial #____ Per.___

Did participant walk? yes____ no____

Did participant use a stopwatch? yes____ no____

Participant's time:_____

Individual Recording Log

I.D.#_____ Male___ Female____ Group #____ Trial #____ Per.___

Did participant walk? yes____ no____

Did participant use a stopwatch? yes____ no____

Participant's time:_____

Individual Recording Log

I.D.#_____ Male___ Female____ Group #____ Trial #____ Per.___

Did participant walk? yes____ no____

Did participant use a stopwatch? yes____ no____

Participant's time:_____

APPENDIX D

Class Recording Log

Class Recording Log: (Per._____)

Class Participation Group: no use____, intermittent use____, constant use____, choice____

			<u>**pretest**</u>		**440 yd. time trials Week #**		<u>**posttest**</u>
I.D#	**(permission)**	**M/F**	**1**	**2**	**4**	**6**	**8**

APPENDIX E

Written Instructions

Written Instructions

You are being asked to complete a 440-yard run (one time around the track) several times during an eight-week period. During week one and week eight, you will complete the 440-yard run once each week. During weeks two through seven, you will run the 440-yard distance twice per week; not on consecutive days. It is requested that you give your maximum effort during each trial.

Each student will wear an identification number on the front of their shirt, at stomach level. An audio video camera will be used to verify number and finish times called out by teacher as each student finishes. Each student will have a partner who records the teacher's time for their particular student. The recorder will indicate if their partner walked during the trial. Walking trials are invalid and will not be used in this study. Some of you will be carrying a stopwatch for part of the study while others will not. If you are asked to carry the stopwatch, it is important that you carry it during future trials, if asked to do so.

Before each trial, you will be given three minutes to warm up as you please. Don't consider this a competition against others in the class. The purpose of this study is to measure your particular fitness level. Everyone is different and has different strengths and weaknesses. It is important to pace yourself and give your best effort each time. You are asked not to talk during the run or slow down to run with someone slower. Run the best pace that you can possibly run. Try not to walk, unless absolutely necessary. The commands will be "ready, set, go". If you are carrying the stopwatch, push the start button on the command "go". Push the stop button once you have completed the 440-yard run and crossed the start/finish line.

Once you are finished with your run, make sure you are out of the way of other runners. Do not talk to anyone else who has not finished. Be sure to warm down after you have run.

You may experience some soreness or fatigue due to previous runs. That is a normal part of training. It is also possible that some future trials may be slower than previous ones. That is normal. The only concern is that you do your best possible each time.

APPENDIX F

Regulatory Policies and Guidelines

Regulatory Policies and Guidelines

In 1996 the Surgeon's General Report, for the first time, published the results of decades of research that has been conducted on physical activity and health. It was determined that people can improve their health and well-being by being physically active. Some of the benefits of regular physical activity include the reduction of the risk of heart disease, diabetes, high blood pressure, colon cancer, and obesity. Being active reduces feelings of depression and anxiety, helps build and maintain healthy bones, muscles and joints and helps promote psychological well-being.

The Surgeon General's Report pinpointed inactivity as a serious nationwide health concern. A public health challenge exists for reducing the national burden of unnecessary illness and premature death. More than 60% of adults and nearly half of young people aged 12-21 are not vigorously active on a regular basis. Physical activity declines dramatically with age during adolescence. Female adolescents are much less active than males. In high schools, enrollment in daily physical education classes dropped from 42% in 1991 to 25% in 1995. Only 19% of all high school students are physically active for twenty minutes or more in physical education classes every day during the school week (U.S. Department of Health and Human Services, 1996).

The Surgeon General's Report identifies promising ways to help people include more physical activity in their lives. Some of the ideas include that schools need to develop well designed programs that will increase physical activity in physical education classes. In addition, the report identified that carefully planned counseling by health care providers can help increase individual physical activity levels. Lastly, the report claimed that a positive community approach would include opening school buildings and shopping malls for walking before or after regular hours, as well as building bicycle and walking paths safe from automobile traffic.

This 1996 Report was endorsed by the Centers for Disease Control (CDC) and The President's Council on Physical Fitness and Sports. This report was instrumental in bringing about awareness of the problem of inactivity and helped initiate future policies and regulations to help remedy the problem of physical inactivity in the United States.

In a Report to the President from the Secretary of Health and Human Services and the Secretary of Education (CDC, 2000) the problems of monitoring youth activity and fitness were addressed. According to the CDC, no national health objective focuses on youth physical fitness. This is largely due to the fact that no system exists to monitor youth physical fitness. Fitness of youth in America was last measured in a nationally representative sample of young people in 1984 and 1986, through the National Children and Youth Fitness Study (NCYFS). The study provided significant data on youth fitness that enabled scientists to establish age and sex-specific health-related fitness norms. A new, ongoing national fitness monitoring system would enable us to document changes in the fitness status of American youth, establish national objectives for youth fitness, and measure progress in meeting those objectives. Measuring youth fitness requires the administration by trained personnel of a variety of tests that assess various components of health-related physical fitness. Because of the complexity of such a study, data should be collected at 5-year intervals. Research is needed to document the effects of participation in physical activity, sports, and physical education on academic performance and youth violence. Unfortunately, schools and communities often lack the technical expertise needed to evaluate the effectiveness of their programs. Schools and communities need guidelines, materials, and ongoing technical assistance to help them appropriately document outcomes generated by their initiatives.

The Center for Disease Control and Prevention established the following:

Guidelines for School and Community Programs to Promote Lifelong Physical Activity Among Young People (1977) that made the following recommendations to increase physical activity among youth:

1. Policy: Establish policies that promote enjoyable, lifelong physical activity among young people.
2. Environment: Provide physical and social environments that encourage and enable safe and enjoyable physical activity.
3. Physical education: Implement physical education curricula and instruction that emphasize enjoyable participation in physical activity and that help students develop the

knowledge, attitudes, motor skills, behavioral skills, and confidence needed to adopt and maintain physically active lifestyles.

4. Health education: Implement health education curricula and instruction that help students develop the knowledge, attitudes, behavioral skills, and confidence needed to adopt and maintain physically active lifestyles.
5. Extracurricular activities: Provide extracurricular physical activity programs that meet the needs and interests of all students.
6. Parental involvement: Include parents and guardians in physical activity instruction and in extracurricular and community physical activity programs, and encourage them to support their children's participation in enjoyable physical activity.
7. Personnel training: Provide training for education, coaching, recreation, health care, and other school and community personnel that imparts the knowledge and skills needed to effectively promote enjoyable, lifelong physical activity among young people.
8. Health services: Assess physical activity patterns among young people, counsel them about physical activity, refer them to appropriate programs, and advocate for physical activity instruction and programs for them.
9. Community programs: Provide a range of developmentally appropriate community sports and recreation programs that are attractive to all young people.
10. Evaluation: Regularly evaluate school and community physical activity instruction, programs, and facilities.

In 1999, the U.S. Department of Health and Human Services (USDHHS) presented, ways to create an enjoyable and beneficial health-related physical fitness education program. The following were the recommendations:

• Place greater emphasis on physical activities that can be enjoyed over a lifetime. Consider offering electives such as aerobic dance classes, step aerobics, stretching or weight training classes, race walking, golf, tennis, cross-country skiing, or swimming.

• Help each student master motor skills and develop a perception of physical competence that supports a wide range of developmentally appropriate physical activity options.

• Explore options so that all children can participate and all can feel like winners—not only

those who are more athletically gifted. Provide environment free of ridicule or embarrassment.

• Place greater emphasis throughout the health or physical education curriculum on the physical, social, and mental benefits of physical activity and on the development of personal skills needed to adopt, maintain, and support physically active lifestyles—skills such as self-assessment, goal setting, self-monitoring and self-regulation, decision making, identifying and overcoming barriers, self-reinforcement, communication, and advocacy skills.

Pate and Hohn (1994) presented the following themes on which to build a sound physical education program:

1. Make promoting lifelong physical activity and fitness the primary goal of physical education.
2. Balance the physical education curriculum so it will function effectively in three educational domains— psychomotor, cognitive, and affective (social). Knowledge and attitudes are the keys to physical education that promote lifelong physical activity and fitness.
3. Ensure students leave their physical education experience with a heightened sense of "physical activity competence". Those who feel competent in physical activity and see themselves in control of their activity seem likely to engage in exercise as a way of life.
4. Provide reasonable amounts of physical activity in physical education.
5. Teach students to self-test so they can measure their own health-related physical fitness, as well as measure their progress and improvement.
6. Work to meet the needs of all students, especially those with special needs and/or have low fitness level.
7. Ensure professional preparation programs prepare future physical education teachers to develop balanced curricula and deliver instruction that is effective in all three education domains.

According to the 1996 Surgeon General's Report, young females, aged 12 to 21, are twice as likely to be inactive as young males. *The Physical Activity and Sport in the Lives of Girls* (President's Council on Physical Fitness and Sports Report, 1997) addresses this

gender-specific concern. It recommended that more quality school-based physical education programs for girls are needed. Girls need to be encouraged to get involved in sport and physical activity at an early age. Stereotypes need to be challenged that impede the girl's participation in sports. There has been progress in some areas. Title IX legislation enacted in 1972 allowed millions of girls to participate in school sports.

According to the above report, the following policies are recommended:

• As student populations become more ethnically diverse, curriculum planners should develop innovative strategies to make physical activities closely suited to girls' interests and cultural backgrounds.

• Organizations (e.g., USOC, NCAA) should focus not only on elite athletes, but on grassroots/community-based programs as well. It is important that some of these programs be designed to appeal to girls.

• Expand health education efforts in schools and community health programs to educate youth and general public concerning the impact of physical activity and sport in the lives of girls.

• Identify programs that effectively use physical activity and sport as vehicles for lowering girls' risk for unwanted sexual behavior and pregnancy.

• Encourage print and broadcast journalists to project appropriate role models for girls. Mass media should avoid using images that create unrealistic expectations related to thin body image.

• Longitudinal, retrospective and case research studies should be funded to determine the extent to which the promotion of daily physical activity for girls reduces later risk for adult diseases such as coronary heart disease, diabetes and certain cancers.

• Health care providers should explore innovative ways to promote physical activity among girls through counseling, guidance and education.

• Coaching certification programs should include information of physical activity and sport for girls' health and development as well as prevention of eating disorders, injury and sexual harassment.

• Continue to revise content and process of physical education classes in order to more

closely meet girls' preferences and concerns. Involve girls in the selection of these activities.

Guidelines and Policies Specific to California:

In 1994, the Physical Education Framework was adopted by the California State Board of Education. The Framework for California Public Schools, K-12, describes a sequential, developmentally age-appropriate physical education program designed to provide students with the knowledge and ability needed to maintain an active, healthy lifestyle. It expands the vision of the 1986 Handbook for Physical Education to be an integral part of the school's education program. The Framework calls for a physical education program that balances and contributes to children's academic learning. It expresses the belief that educators, working together with students, the family, and the community, can successfully guide our children and youth to discover their talents and develop the knowledge and skills needed to use those talents in achieving personal goals.

In a 2001 California Department of Education News release, Delaine Eastin, State Superintendent of Public Instruction announced the results of last spring's fitness tests for grades five, seven, and nine. Ninety percent of schools submitted data in 2001. Nearly half of the students tested were unable to pass the minimum fitness standard for aerobic capacity; the most important indicator of physical fitness. Eastin said, "it is critical that schools provide students with knowledge and abilities needed to maintain activity and healthy lifestyles" (p. 2).

The Physical Education Framework states that a well-planned physical education program is sequential, developmental, and age-appropriate. Effective programs should help children and youth develop a lifelong commitment to their own physical well-being, health, and fitness, with clear emphasis on a variety of pleasurable physical activities and an active lifestyle. The goal of the physical educator should be not to identify winners, but to make winners of ordinary students.

A comprehensive school health system includes the following aspects: health education, physical education, health services, nutrition services, psychological and counseling services, safe and healthy school environments, health promotion for staff, parent and community involvement. In a comprehensive school health system, the physical

education and health education components should compliment each other. As a result of this, Health Framework for California Public Schools was also developed in 1994. The Physical Education Framework focuses on three goals: (1) movement skills and movement knowledge, (2) self-image and personal development, and (3) social development. The Health Framework consists of four unifying ideas: acceptance of personal responsibility for lifelong health, respect for and promotion of the health of others, understanding of the process of growth and development, and informed use of health-related information, products, and services. Taken together, these documents should create an educational environment for children to learn the importance of living an active healthy life.

APPENDIX G

Raw Data

Raw Data

Individual Data Recordings (Pretest, Probe 1, Probe 2, Probe 3, Posttest)

Group (Gr.), B/G (Boys or Girls), Pre (Pretest), P1 (Probe 1), P2 (Probe 2), P3 (Probe 3), Post (Posttest)

Gr.	B/G	ID	Pre	P1	P2	P3	Post
1	B	1	94	94	—	98	96
1	B	2	137	132	145	143	131
1	B	3	139	120	—	133	142
1	B	4	97	103	100	101	100
1	B	6	100	102	—	104	102
1	B	7	135	111	130	118	118
1	B	8	158	169	—	130	173
1	B	10	97	102	102	97	97
1	B	11	110	112	99	107	103
1	B	12	141	137	—	132	139
1	G	1	105	115	107	116	122
1	G	3	151	164	163	170	139
1	G	4	108	116	120	114	119
1	G	5	132	114	120	129	111
1	G	6	124	109	—	111	121
1	G	7	148	136	140	129	137
1	G	8	144	131	133	130	139
1	G	9	102	106	110	112	108
1	G	11	95	97	92	94	95
1	G	12	91	90	—	96	94
1	G	13	124	107	108	101	118
1	G	14	126	118	133	124	126
1	G	15	116	134	134	123	142
1	G	16	102	107	101	104	105
1	G	17	116	103	100	107	119

1	G	18	111	107	108	142	132
1	G	19	118	117	126	108	139
1	G	20	119	113	122	116	119
1	G	21	106	109	123	113	114
1	G	22	118	—	122	124	120
1	G	23	157	153	164	155	155
1	G	24	101	108	113	111	135

Gr.	B/G	ID	Pre	P1	P2	P3	Post
2	B	1	128	111	108	98	102
2	B	2	119	120	124	115	128
2	B	3	87	81	85	82	78
2	B	5	101	95	93	98	89
2	B	6	101	97	116	111	108
2	B	7	145	153	204	193	176
2	B	8	102	99	110	103	109
2	B	9	107	105	105	115	109
2	B	10	111	110	106	118	111
2	B	11	110	114	105	104	107
2	B	12	113	112	130	114	127
2	B	14	114	110	108	110	110
2	B	16	99	90	—	94	106
2	G	1	121	118	120	124	125
2	G	2	130	138	135	135	147
2	G	4	117	117	129	111	121
2	G	5	107	114	113	112	114
2	G	6	124	124	125	125	128
2	G	7	102	114	120	112	110
2	G	8	122	123	129	128	121
2	G	9	131	127	137	134	133
2	G	10	115	112	118	112	110

2	G	11	132	136	136	125	148
2	G	12	120	121	114	111	124
2	G	13	133	137	157	141	154
2	G	14	129	118	121	118	118
2	G	15	131	123	134	133	132
2	G	17	103	103	112	104	103
2	G	18	124	124	127	117	120

Gr.	B/G	ID	Pre	P1	P2	P3	Post
3	B	1	114	128	123	117	108
3	B	2	96	97	104	99	128
3	B	3	125	124	123	142	156
3	B	4	151	142	146	141	148
3	B	5	139	112	119	125	102
3	B	6	99	92	109	88	97
3	B	7	92	110	114	93	98
3	B	8	111	113	113	108	115
3	B	9	94	99	105	88	96
3	B	10	89	85	91	86	89
3	B	11	131	96	105	94	88
3	B	12	99	97	92	86	89
3	B	13	109	98	116	103	103
3	B	15	97	94	—	97	105
3	B	16	90	87	91	84	86
3	B	18	118	124	132	117	108
3	B	19	101	106	101	97	99
3	B	20	148	163	161	140	115
3	G	1	155	159	157	159	162
3	G	2	119	144	143	127	139
3	G	4	162	154	153	169	170
3	G	5	128	140	145	—	137

3	G	6	132	126	155	133	126
3	G	7	131	131	130	134	127
3	G	8	108	109	111	109	135
3	G	9	126	126	129	128	122
3	G	10	114	120	132	128	—
3	G	12	151	143	131	140	138
3	G	15	138	148	147	—	139

Gr.	B/G	ID	Pre	P1	P2	P3	Post
4	B	1	98	99	—	91	94
4	B	2	109	106	104	105	110
4	B	3	133	132	141	130	132
4	B	4	133	141	133	136	131
4	B	5	129	138	127	116	127
4	B	8	130	126	134	128	130
4	B	10	132	130	—	117	121
4	B	11	78	79	83	85	90
4	B	12	80	82	88	83	82
4	B	13	123	110	118	106	107
4	B	14	95	92	104	103	96
4	B	16	135	146	150	125	117
4	B	17	134	128	130	127	146
4	B	18	115	113	106	101	112
4	B	19	85	90	102	109	99
4	B	20	143	134	140	120	125
4	B	21	100	90	94	122	107
4	B	22	101	98	98	108	99
4	B	23	117	117	113	102	106
4	B	24	87	92	—	96	90
4	B	25	98	—	98	146	92
4	B	26	110	106	122	99	109

4	B	27	126	137	128	138	125
4	G	1	147	144	144	132	138
4	G	2	136	131	129	—	129
4	G	3	131	131	130	123	130
4	G	4	103	98	101	88	90
4	G	5	117	118	122	122	120
4	G	6	124	116	110	128	115
4	G	7	106	100	122	100	121
4	G	8	113	106	—	—	122
4	G	9	101	101	99	93	97
4	G	10	126	122	121	115	123
4	G	11	132	121	121	120	122
4	G	13	92	90	95	89	87
4	G	14	124	109	117	105	117
4	G	15	141	145	142	—	140
4	G	16	99	95	100	91	92
4	G	17	151	152	132	131	143
4	G	18	121	109	112	110	115
4	G	20	140	134	105	—	125
4	G	21	134	125	—	112	118
4	G	22	177	179	184	188	187
4	G	23	145	144	147	153	—
4	G	24	173	164	170	160	181
4	G	25	115	113	111	118	116
4	G	26	111	124	112	111	110
4	G	28	106	99	105	104	104
4	G	29	110	112	110	102	107
4	G	30	132	119	119	115	111